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CONTENTS

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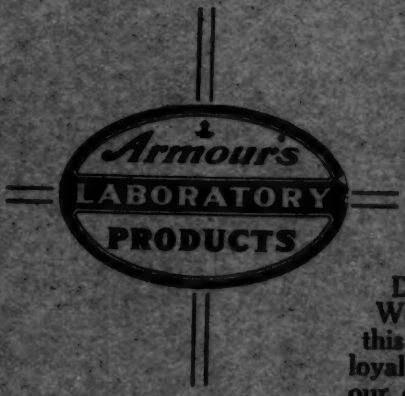

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THE AMERICAN
JOURNAL OF PHARMACY

VOL. 94. JULY, 1922. NO. 7.

EDITORIAL

AS OTHERS SEE US.

"O wad some power the giftie gie us
To see oursel's as others see us
It wad frae monie a blunder free us
And foolish notion."

So sang the bard of bonnie Scotland. And the "giftie" comes to us now through the medium of the Philadelphia *Public Ledger,* holding in front of us the editorial mirror so that we can peer in and see our true reflection.

And this is what we see:

"ALAS, POOR DRUGGIST!

"And now a speaker before the sixteenth annual convention of the California Pharmaceutical Association stands on the platform and delivers himself of the following sentiment: 'Every man who lays claim to any class at all has his pet shade of face powder, his particular fragrance of toilet water, his favorite shaving soap and his distinctive preference in nail polish. The up-to-date man seeks to make himself just as attractive to women as they are supposed to strive to make themselves to men. Druggists must recognize the fact that men now constitute a great and rapidly growing percentage of the patrons of the toilet articles, and they must make greater efforts to accommodate that class of patronage.'

"Time was when the life of a druggist might have been considered a happy one. That was in the balmy and beneficent days of a simpler era. In those days a druggist simply had to compound prescriptions and sell some uncomplicated drugs of common household usage. He could afford to sit outside his store half the afternoon on pleasant days and dispense wisdom to his neighbors. But those sweetly idyllic days are o'er.

"The druggist was forced by evolution of business practice to become a merchant of parts. His day of peace ended when he abandoned the colored lights in his window and added fly-paper to his stock of medicines. He has been adding things ever since. It is long since drugs made a druggist. Nowadays it is note-paper, children's puzzles and safety razors. He watches the once tentative soda fountain grow into a busy quick-lunch counter and the erstwhile speculative pile of Robinson's Family Almanack metamorphosize itself into a magazine and book stand, with a case of fountain pens as an appendix; and as he watches he must regret the days he spent getting his degree of doctor of pharmacy that might have been spent more profitably in a business college.

"Of course, he has the satisfaction of knowing that he fills a more active and conspicuous place in the scheme of civilization than he ever did before. But his satisfaction must be tinged with regret over his ever-increasing responsibilities. And now there is this latest burden. The gentleman from California informs him that herafter he must help bear the burden of 'every man who lays claim to any class at all.' And there are so many men who lay claim to class, even if it be so little, as to be called any at all. With his other cares the druggist must now assume that of chaperoning their development of class consciousness. He must guide them in the proper adjustments of their reactions to the fragrance of various toilet waters. He must help them to cultivate a nice taste in nail polish. If they go wrong on the shade of their face powder, his the blame!

"Verily, the march of progress lays a heavy hand upon us. And here is a new item, this discovery that the male of humankind has set out to emulate the peacock by making itself attractive to the female of the species with the aid of toilet water, face powder, nail polish and the more subtly seductive varieties of shaving soap. Alas, poor druggist!"

The vision ends. The reflection vanishes.

But we are not conscious after all that we have looked at ourselves. Comes to us the recollection of a seashore trip, when, at that resort, we looked into a crooked mirror and we saw a crooked man, and, although we knew that the crooked man had on our clothes and a personality that, bereft of its distortions, might have looked our very part—still we knew in our heart that this figure in the mirror did not do us justice at all and was but the fun-provoking contortion of a perverted mirror. It produced an earnest laugh, but we promptly sauntered away from that mirror, forgiving it and aiming to forget it, but clandestinely keeping an eye to windward

searching for an honest mirror so that we might convince ourselves that we were not so foolish looking after all.

Indeed, then, we are indebted to the columns of the *Ledger* for holding before us a fantastic mirror that provides us with an earnest laugh. At the same time we do grant that it portrays part of our anatomical landscape with perfect verity.

But there is a greater charm in the story of another mirror, and we take liberties in recording its picture:

[1]"The learned looking, long faced apothecary of other days, with his round skull cap of ancient black, and the frayed coat of ill-dyed mohair, is no longer with us. The scantily windowed emporium where his highness the apothecary held court among his herbs and simples and the gaudy pots of cerates and unguents, is but a retrospective vision, and while we can quite comfortably conjure up nice things to say about the venerable old institution and its occupant, none of us in a sense regrets the passing away of them. The evolution which came with the racing years saw the dusty but respectable old apothecary changed into the dapper business-like pharmacist who, at our street corner, cheerfully supplies our every want, in his and many other lines. The dustier emporium where the accumulated odors of old and evil smelling herbs long offended our finer sensibilities has been supplanted by the broad windowed and well ventilated business establishment where the olfactory equipment of the most delicate patron is never offended except when an occasional prescriber persists in exploiting the foul valerianate.

"With this mutation, however, came of necessity a complementary change and a change that is not to the liking of any of us. The apothecary of other years, in spite of his murkiness and dust, cherished in his heart ideals that reflected much credit on his profession. He was often a keen student, a wide reader, and a clever experimenter, and quite conscious of his importance as the physician's co-worker and assistant in the altruistic task of curing the ills of the people.

"The pills that he dispensed in their neat turned wooden containers were his own handiwork. He fashioned them with his own fingers and knew with considerable exactness just what they contained and precisely how much of each ingredient. The plaster which he handed to his patron was likewise a product of his establishment. Evenly spread on a piece of fine chamois or flannel and carefully cut with his own deft hands it pos-

[1] A former contribution by the Editor to another drug journal.

sessed virtues that no factory made plaster, no matter how pleasing to the eye, can ever hope to possess. His unguents and cerates were especially his pride and his repository of these smooth and gritless articles of medical ware held a prominent place in his emporium. The containers, gaudy in blue and gold and neatly arranged in even shouldered rows like a street of mosques or minarets, blazoned forth the story of his eternal care in all things that really pertained to the professional side of his make-up.

"Today, however, the rolling of real pills is almost an Egyptian art, and the novice on the staff of the pharmacy wonders whether the pill machine is an instrument of torture or some forbidden gambling device. The excipient bottle hides behind a bottle of aspirin tablets and the althæa container complains of inertia. The plaster machine, perforator and cutter, rusty and forlorn looking, repose in the cellar with the rest of the questionable junk, those things which we expect to discard tomorrow, the tomorrow that never comes. The lettered ointment pots still remain, but bereft of their former glory and their contents can no longer proclaim the glory of the magister's handiwork, for they are but part of a fifty pound batch from the ointment factory.

"The pills in the modern pharmacy, the thousand odd varieties in their riot of colorful trappings, all come from some pill factory or other where giddy machinery turns them out by the millions, even-shaped and uniform in size. They lack the personality of the old hand made soft mass pill of the apothecary that even before Bertillon's days often exhibited very distinct digital prints. What they lack in personality they may discount in cleanliness. But we still persist in the belief that in therapeutic efficacy the pills of the old apothecary far excel the fossilized, petrified pills dispensed today in many a store and many a doctor's office. Those hand made plasters that we know no more are displaced by the neat gauze covered plasters made by the mile and sold by the yard. And other, many other, things that the old apothecary loved to prepare with his own hands are now made in the factory and doled out in portions to the purchasing druggist.

"Thus the work of the apothecary has gone out of his hands and he is now in the main but a jobber of other people's manufactures. Many persons today say that the pharmacist as such has no real reason for existence as a professional man; that the commercial phase of his makeup has of necessity and quite naturally overwhelmed or eclipsed the professional side of his calling, and the grocer and hardware dealer have as much right as the pharmacist to be deemed professional. There is quite some reason for persons holding this viewpoint. Many drug

stores are ridding themselves of their prescription practice because they find selling talking machines more *profitable,* and since profit is all that the philosopher's stone means for some people—that is a wise thing for them to do. Other drug stores for all the real prescription service that they can furnish might serve the public *better* by selling more talking machines and compounding fewer prescriptions.

"There is no one to blame for these changes. They have come to us simply as a natural course of events. Pharmacy cannot say that her birthright has been craftily taken away from her. Nor can we say that the change has been due to negligence on the part of the individual pharmacist. Indeed, with the rapid and marked changes that have come his way it is surprising that things remain as well as they do.

"We have spoken of yesterday and of today, but what does tomorrow hold for us? If the pessimist among us can dwell on the lost art and the passing away of the profession, can the optimist see in tomorrow a promise of a return of the heritage and a rehabilitation of the calling? Shall we go on as vendors of ready made medicines, and as commercial, public serving institutions on a par with the corner grocery or delicatessen, or are there hopes of more opportunities for the pharmacist to offer real professional service? That is the question.

"And it is a question that is difficult to answer even in an approximately correct fashion. In truth ninety per cent. of our retail pharmacists, in spite of their inherent desire to be considered members of a profession, are *disinterested* and meekly accept a tradesman's mode of making a living. And this is in a sense humanly natural. It is almost inconceivable that they can, under existing conditions, aspire to anything higher than or different from what they are doing. They intimate that the greatest portion of the agitation which constantly demands the attention of the calling is fostered by persons who are in a sense outside the realm of the calling itself. The college professors and State Board members are stated by them to be responsible for the gossiping and mischief making that often bid fair to disturb the harmony of the inner circle of the pharmacy and to eventually cause the divorce of the professional from the commercial side of the calling.

"Asks the corner druggist 'why on earth the need for all this disturbance? There is nothing wrong at all in harmonizing the business phase with the professional end of my life work. I can compound prescriptions quite as accurately and at the same time enhance my picayune professional receipts by collecting commissions on the sale of a Victrola.' And the citizenry has been taught to understand things according to his

light. The lay person will cheerfully listen to a selection of records while waiting to have his prescription filled even though he appreciates that it is a long way from selling a talking machine to compounding a prescription. The same person would steer very clear of a doctor who would listen to his heart sounds and at the same time try to sell him an automobile.

"In other words, the public has been improperly guided to the illusion that the diversified features of the pharmacist's business in no way impair his usefulness as a man who in his spare moments can offer a little professional service in the way of compounding a prescription or two. And without being unduly pessimistic we often feel that it is this apathy exhibited by the public mind that has helped to demoralize pharmacy. It is only when the public is disillusioned and taught again to demand real professional service from the pharmacist that pharmacy will come into its own. And how can the public obtain this new impression of the service that can be offered by the new pharmacist? As we see it—only after the pharmacist is properly equipped to offer this type of professional service—and this equipment consists of a liberal education, and the capacity to serve.

"There never has been a time more fortunate than the present for pharmacy to assert itself and to proclaim its real and tangible claim and ability to render truly professional service. The art of medicine is rapidly attaining the heights of true science and the time is long past when the 'handmaiden' of medicine had nothing else in her code of duties but the compounding and dispensing of medicine. The scope of true pharmaceutical service has considerably broadened and the prescription department will not be the only herald of professionalism in the pharmacy of tomorrow. There are opportunities, even if not boundless, for offering clinical service. The new pharmacist shall and must be so trained that he can offer the physician this high type of service.

"The natural recoil which wise men long ago predicted has come and physicians do not place as much reliance today upon purple pills and tasteless tablets as they did a decade ago. The experience of years has taught them that the old fashioned recipe, freshly concocted and properly prepared, has much in point of advantage over factory made compressed medicines. The world war period also has changed many dispensers into prescribers, who found it more economical to let the pharmacist buy when the prices of drug substances climbed to such dizzy heights and many of these war made prescribers will continue in their more pleasant and less costly habits for some time.

"Botanical drugs are rapidly pushing to the front again, and the old school which taught 'that there is a plant in Nature's garden for every human ill' is re-establishing its grip on the physician's mind.

"With these facts in mind there comes to us mentally a picture of what we choose to term the new pharmacy.

"To the general public this pharmacy will offer such articles as are legitimate drug store products—sickroom equipment, spices, crude drugs, toilet preparations and perfumes, official preparations and household medicines. It will leave the coffee and tea to the grocer, the cigars and cigarettes to the corner cigar store, the soda fountain and candy to the confectioner. To the physician it will offer clinical service, diagnostic tests such as blood counts, biochemic analyses, bacteriologic procedures, vaccine and bacterin preparations, urinalyses, water analyses, sputum and smear examinations, complement fixation tests and all such items of clinical work.

"The pharmacy can well be the place where the physician can obtain information concerning new and rare articles of materia medica as well as a supply of the articles themselves. The library of the pharmacy shall be comprehensive and at the service of the physician. The well trained pharmacist can readily by these means become the confidant of both the physician and patient and will earn the respect of both. The prescription department will be modern in every respect and supplied with nothing but the highest grade of drugs and medicines. Its personnel shall be intelligent and painstakingly careful, its equipment up to date, and its conduct immaculately clean and correct. There will be no counter prescribing, and the complementary evil—dispensing by the physician—will naturally subside and probably be a negligible factor of competition.

"It may be only the Arcadian pharmacy that will conform to all the foregoing stipulations—but Arcadia was never closer to us than it is now.

"The recrudescence and rehabilitation of the profession of pharmacy will be made certain only if standards and instruments of education are elevated to such a scale as to insure for the conduct of these several professional duties men who are completely fitted by training to their respective parts. The divorce of the commercial from the professional will come then as a matter of course. The writing on the wall has it that the ninety per cent. commercial and ten per cent. professional drug store shall inevitably pass away and its professional duties be absorbed by the new and ethical pharmacy.

"The new pharmacy managed by the new pharmacist is to re-establish itself as a serious, legitimate and altruistic profession, and the sooner it comes the better it will be for everyone concerned, the physician, the laity and the pharmacist."

And the story of this mirror is no illusion.

I. G.

SELECTED EDITORIAL

THE FAITH OF THE SCIENTIST.*

The things we are surest about we do not talk about. We do not have to. There are certain things that all sensible men take for granted and there is no use tying to convince those who are not sensible. But once in a while it is well to dig down to the very foundations of our faith to see what they are.

There is one principle that underlies all of the sciences as it does all ordinary life and yet is not often specifically pointed out.

This is the invariance of nature or the constancy of cause and effect. That under the same circumstances the same thing will happen always anywhere. This is a bit vague, for, of course, the circumstances are never twice the same all through the universe. And nobody can prove it or tell why it must be so.

For instance, who knows if the law of gravitation will hold true tomorrow? Why should not all particles of matter repel one another instead of attracting one another?

Suppose some erratic oak tree, in a desire to be original, should begin to bear watermelons instead of acorns? Who is entitled to tell it that it cannot? Suppose the earth should get tired of always turning the same way and take a notion to turn from east to west for a change? How do you know it won't? You don't know. Yet you are sure it won't.

The only reason you can give is that this never has happened, but that is merely the prejudice of the conservative, the negation of all progress.

*Through *Science Service.*

Yet this principle, that like causes always produce like effects, has to be assumed by pure faith before we can undertake our next day's work. It is also a necessary assumption in all scientific calculations. Let us consider, for instance, the astronomer, for he indulges in longer term prophecies with greater assurance and success than any other scientist. The point is best put by a French poet, Sully-Prudhomme, in a beautiful sonnet that may be translated as follows:

THE RENDEZVOUS

By Sully-Prudhomme

'Tis late; the astronomer his vigil stern
On lofty tower prolongs. In silent space
He seeks his golden isles, nor turns his face
Till starry host grows pale with morn's return.

Bright worlds, as grain the winnowing flail doth spurn,
Fly past thick-clustering nebulæ a-light;
His eager gaze one streaming orb pursues in flight,
He calls: "This hour, ten centuries hence, return."

Return it shall. Nor time nor space abates,
The Everlasting Fact it never can assail.
Men pass from view; Eternal Science waits.

And though Humanity itself should fail,
Fair Truth will stand, alone, upon the tower
To keep that tryst at the appointed hour.

(*Translated by F. P. H.*)

Now I fancy that Sully-Prudhomme, with poetic license, has exaggerated a bit the marvellous power of prescience possessed by the astronomer. To fix the exact hour for a comet's return a thousand years in advance is rather closer figuring than we can do with certainty. There is always the possibility that the comet may be wrecked in a collision or side-tracked by some star.

But Sully-Prudhomme does not exaggerate the confidence of the scientist in his fundamental principle of the constancy of natural law. The astronomer is willing to stake his life, or what he values more, his scientific reputation, that if none of these accidents happen and if he has rightly weighed all the factors involved the result will be exactly as he says. He is so sure of it that if a comet does not return on an expected date he will be confident that some unfore-

seen force has intervened and he will set about to find it. If he does not find out what is wrong, other astronomers will take up the task and devote their lives to finding the cause of the discrepancy. They may keep at the problem for a thousand years and never think of saying: "Well, perhaps there isn't any reason. Comets are queer things anyway."

And if an oak tree should take to bearing watermelons—things almost as unexpected have happened—the botanists would be absolutely positive there was something new inside or outside the tree that set it to acting so. They would start to experimenting and probably find out what it was in the course of time. "There's a reason" is the faith of the scientist and so far he has never been belied.

EDWIN E. SLOSSON.

ORIGINAL PAPERS

THE PROFESSION OF PHARMACY.*

By VICTOR C. VAUGHAN, M. D., LL. D.

Mr. President, Members of the Faculty, Students of the Graduating Class:

It is a great honor to be called upon to deliver the commencement address at this ancient and honorable institution of learning. I have chosen to speak to you concerning the profession of pharmacy. From the remotest times of which we have record those who prepare medicines have been set aside as a special, learned and honorable class. In the papyrus of Sent, written 3000 B. C., it is shown that the physicians of that time sent their prescriptions to the priests of Isis, who prepared them, and accompanied their preparation by certain ceremonies and incantations. In the Ebers papyrus, 1550 B. C., special mention is made of pharmaceutical preparations, including not only vegetable drugs, but also mineral preparations, ointments, blisters, etc. In the Old Testament the apothecary and his art are frequently mentioned. Moses, in the thirtieth chapter of Exodus, is instructed by the Lord to take pure myrrh, sweet cinnamon and

*Commencement Address before the Philadelphia College of Pharmacy, June, 1922.

calamus, and make thereof a holy ointment compounded after the art of the apothecary. With this he was told to annoint Aaron and his sons and consecrate them that they may minster unto the Lord. In Ecclesiastes we are informed that the pharmacy of that time included a large number of vegetable preparations—myrrh, calamus, cassia, cinnamon, galbanum, and others being mentioned. The gathering of mandrakes and their value are mentioned and emphasized in the thirtieth chapter of Genesis.

The Chinese practiced pharmacy many centuries before our era, and when their records have been studied accurately I have no doubt that much light will be thrown upon the early superstition of man. Within our own time we have seen native Chinese prescriptions made up of varied collections of plants mixed with the bones and excrement of animals. We look upon these remedies and think of man's taking them with disgust, but we should remember that for centuries it was a common belief, apparently of world-wide distribution, that the excrements of animals retained the properties of the animal from which they came. The English pharmacopeia as late as 1721 provided for remedies prepared from oyster shells, crabs' eyes, burnt harts' horns, crabs' claws, and other equally inert and uninviting preparations. A powder sold in England as late as the middle of the nineteenth century consisted of crabs' eyes, crabs' claws, certain excrementitious substances, and a jelly obtained by boiling the horns of a stag. This powder had quite a vogue, was prescribed by some learned physicians, and was purchased by the superstitious wealthy at a price of 40s. per ounce. Indeed, it is not necessary to go back far in years or to leave our own country in order to show that animal excrement has been used in the treatment of disease. I, myself, have seen a tea prepared from the dung of sheep administered to children suffering from measles, and I have known of the application of the skin of a black cat, killed in the dark of the moon, to the head as a cure for epilepsy.

Polypharmacy, by which is understood the mixture of a great many substances in a single prescription, came into vogue many centuries ago and has not entirely disappeared up to the present time, although it is condemned by both pharmacist and physician. Some of the older shotgun prescriptions contained from fifty to seventy ingredients, and I have found a patient taking, on the pre-

scription of a physician, not only chemical incompatibles, but also physiologic antagonists.

One of the most ancient, and probably the most important, works on materia medica of the time was written in the first century of our era by Dioscorides. This work enumerated four hundred plants and drugs, and it continued to be the chief reference work on this subject until the seventeenth century.

Laws for the purpose of securing the proper perparation of prescriptions and for the prevention of the introduction of poisonous ingredients extend far back in time. In the eighth century the Arabs, who at that time were the leaders in medicine, legalized the apothecary and prescribed his duties. In the thirteenth century Frederick II enacted a law, which for a long time remained in force in Sicily, and which forbade the employment in any prescription of impure, adulterated, or noxious ingredients. According to this law, pharmacists were divided into two classes, one of which limited its trade to the sale of simple drugs at prices fixed by the law, while the other prepared and dispensed prescriptions written by medical men. During the middle ages pharmacy seems to have been largely under the control of the Benedictine Monks, some of whom, like Basil Valentine, made important contributions to both pharmacy and chemistry.

A prominent London apothecary, a cousin of Anne Boleyn, one of the unfortunate wives of Henry VIII, wrote as follows concerning the pharmacist: "His garden must be at hand, with plenty of herbs, and seeds, and roots. He must read Dioscorides. He must have mortars, pots, filters, glasses and boxes clean and sweet. He must have two places in the shop, one most clean for physic, and a base place for chirurgic stuff. He is neither to increase nor to diminish the physician's prescription; he is neither to buy nor to sell rotten drugs. He is only to meddle in his own vocation; and to remember that his office is only to be the physician's cook." The apothecaries, or pharmacists, of England were first incorporated with the grocers, but this proved unsatisfactory and a separate charter was obtained in 1617. There were at that time, it appears, one hundred and fourteen pharmacists in London. The law provided that the sale of medicines should be wholly in the hands of the apothecaries, the surgeons on the one hand and the grocers on the other, being forbidden to sell medicines. In 1841 the Pharmaceutical Society of Great Britain, "for advancing the knowledge of chemistry and pharmacy and

promoting a uniform system of education for those who should practice the same, also for protecting the collective and individual interests and privileges of all its members, in the event of any hostile attack in Parliament or elsewhere," was instituted and two years later a royal charter was granted. This society now controls and directs the practice of pharmacy in Great Britain. In that country one who wishes to enter the profession must pass a preliminary examination before he can become a registered student or apprentice. A second examination is necessary before he can become a registered chemist or druggist. A third, or major, examination qualifies for registration as a pharmaceutical chemist. In most countries of Continental Europe, the preparation and dispensing of prescriptions is limited to pharmacists. The pharmacist is not allowed to prescribe, nor is the medical man permitted to dispense except under special license and in rural and village communities where a pharmacist could not make a living. In Holland it is illegal for a pharmacist and physician to make any agreement as to the supply or price of medicine. In Austria, Germany, Italy, and Russia, the number of apothecaries is limited by law according to the population. In France, Switzerland, Belgium and Holland there is no such limitation, but in practically all Continental European countries the pharmacist confines himself to the filling of prescriptions, of which he must keep copies for a definite time.

The history of pharmacy in this country is, I suppose, quite familiar to all of you. This college, I believe, was the first devoted to pharmacy to be established in the United States, and it is not a discourtesy to other colleges of pharmacy to say that this institution has been the leader in professional education throughout the one hundred years of its existence. During the third quarter of the last century, schools of pharmacy were established in several state universities. At that time the pharmacy school consisted largely of the chemical laboratory and one of the professors in the pharmacy school was, in several instances, at least, director of the chemical laboratory. About the same time the manufacturing chemist came into existence and developed like a green bay tree. The compounding of prescriptions by the pharmacist has become an almost lost art; in fact, the local pharmacy has almost passed out of existence. The drug store has been converted into soft drink parlors, cigar shops, and miscellaneous sales rooms. In the drug stores medicines prepared by the

manufacturing chemist are sold, but the salesman need not know anything about pharmacy. To the superficial observer the pharmacist has lost much in dignity and importance. Fifty years or more ago the apothecary's apprentice was instructed in the delicate and difficult art of compounding prescriptions. He took his first lessons in practical chemistry. He was compelled by the demands made upon him daily to familiarize himself with the directions contained in the pharmacopeia. Hourly he consulted that voluminous and weighty volume known as the dispensatory. In order to answer intelligently the many questions asked him, he spent largely of his spare hours poring over his materia medica, and in order to keep abreast of the times and be able to converse with the young doctor whose pills and powders he compounded, he had to read current medical and pharmaceutical journals. Indeed, the old pharmacy laid the foundation for many a chemist, pointed out the pathway to many a naturalist, and opened the way for many young men who entered upon the study of medicine. The apothecary's clerk of that time, while he did much menial work, such as cleaning mortars and pestles, was compelled to develop his brain at the same time. As a school of experience and an opportunity for intellectual growth, the drug store of today, with its fancy show windows, its marble soda water fountain, and its ice cream restaurant attachment, does not compare with the sombre old apothecary shop of one hundred years ago. Does this mean that there is no longer need of intellectuality in the life of the pharmacist? I think not. The pharmacist may be defined as one who is concerned in the preparation of any medicinal agent, whether such agent be mineral, vegetable, synthetic, or biologic; in fact, the field of pharmacy has been within the past fifty years so greatly enlarged, so markedly increased in fertility, so greatly multiplied in the variety of its products and so diversified in the methods required for its proper cultivation, that the old-time pharmacist has for the time been almost forgotten; but we cannot afford to neglect him or to dispense with his services.

In fact, the duties of the pharmacist have been multiplied a hundredfold. The manufacturing chemist of today in part takes the place of the old-time pharmacist. Instead of making pills in a mortar and on a tile by the dozen he now makes them in hundreds, runs the paste through a machine, and turns out the product by the hogshead. He coats, glosses or capsules his nauseous drugs, render-

ing their deglutition more acceptable, while in no way impairing the promptness and efficiency of their action. There is still a promising field for research in the purification and modification of the active principles of certain plants and their products. That this is true is shown by the recent advances made in the treatment of leprosy with the purified substances obtained from chalmoogra oil. The relation between chemical structure and physiologic action suggested many years ago by my friend, Sir Lauder Brunton, has not yet been satisfactorily worked out, but the diggings have unearthed valuable nuggets and the possibility of reaching or tapping a paying vein is still open to us. During this dispersion period of the activities of the pharmacist, the science of pharmacology has come into existence, and, so far, its development has been gratifying. It is now one of the functions, and a most important one, of the pharmacist to test the physiologic action of medicinal agents on the lower animals. It would be most interesting, had I time, to trace the development of studies on the physiologic effects of drugs and other agents. It is said that this work was begun by Wepfer and Brunner about the middle of the seventeenth century, when they demonstrated and studied the tetanizing action of nux vomica on dogs. Early in the eighteenth century the great physiologist, Albert von Haller, experimented upon man and animals. In 1765 Fontana reported 6000 experiments with the venom of snakes on animals. In the early part of the nineteenth century pharmacology, or the study of the action of drugs, their active principles and chemical compounds, upon the lower animals was greatly advanced by French physiologists, notably Magendie, Claude Bernard and others. About 1850 Buchheim founded in the University of Dorpat, the first pharmacologic laboratory, in which he and his successor, Kobert, did splendid work. In 1873 there appeared the first special journal on pharmacology, the *Archiv. für Experimentelle Pathologie und Pharmakologie,* or, as it is generally known, *Schmiedeberg's Archiv.* There are now at least three journals of world-wide repute devoted to this subject. Basil Valentine, when he wished to study the effects of antimony on animals, at least so the report goes, first tried his preparation on hogs and finding that these animals thrived on his discovery, fed some of his fellow-monks with the preparation; and finding that they promptly died, he designated his discovery as antimonk or antimony. Having advanced somewhat in our morals since the time of the learned monk just re-

ferred to, we now test out our medicinal agents on rats, guinea pigs, dogs and cats, although there are those among us who seem to think that we should return to the old method of first testing out our discoveries on human beings or give up all effort to make discoveries in our combat with disease and in our effort to protect our fellow man from unnecessary suffering and untimely death.

The purpose of such a school as yours, whose commencement exercises we are now celebrating, is not, as I conceive it, to supply the drug store of today with salesmen. In my opinion, this school has a higher function than that of furnishing clerks who wait upon customers at soda water fountains, sell cigars, and incidentally fill the prescriptions of physicians for preparations manufactured by large drug houses. There is need of skilled chemists in every one of the many branches into which this science is now divided. All the mysteries of inorganic chemistry are not yet solved and in these lie great possibilities, the realizaton of which may materially modify the progress of civilization. The unknown in plant chemistry offers a boundless field for research. There are chemical substances essential to plant growth, the formulæ of which are as yet unknown. A few years ago the food chemist thought that he had quite exhausted his problem. He had determined the amount and kind of inorganic salts, carbohydrates, fats and proteins—necessary food constituents of the daily ration of the man who would do a day's work, but when he tried to sustain health by the administration of his purified food principles he found that something was lacking. Then he read history a little more closely and acquainted himself with the wonderful stories of scurvy and beriberi and how epidemics of these diseases had been arrested simply by the administration of certain foods. In short, he found that something besides his five food principles was necessary in order to keep the animal body in health and enable it to do its work. These unknown but essential constituents of our daily food are now designated as vitamins, a term which inadequately covers our ignorance. Indeed, some are inclined to say that the vitamins have no actual existence and that their functions result from certain unknown relationships between constituents of food which are probably well known. This seems visionary and a search through chemical and physicial agencies for the vitamins should be tempting to both the skill and intelligence of the brighest young men.

It has long been known that both therapeutic and poisonous sub-

stances when introduced into the animal body have a selective action. Each seeks its own predilection tissue in the body, and acts more or less specifically thereon. Strychnia and allied bodies manifest their activity, most seriously at least, on the cord, and modify those bodily functions which are controlled by the nerves originating in the spinal cord. Other drugs act more specifically on the liver, some on the alimentary canal, others on the organs of elimination, while still others have a more direct action upon certain constituents of the blood. In searching for new therapeutic agents, Ehrlich has pointed out the way in the discovery of 606 and the demonstration that this product has a specific action upon the spirochetes of syphilis; in fact, empirically the medical profession has known for some centuries that quinine has a specific action on the malarial poison, and that the active principle of ipecac has a similar effect upon the organisms which cause certain forms of dysentery. It is within the range of possibility that the time will come that a preparation will be built up synthetically for the purpose of having some direct action upon a given tissue or upon some parasite, the destruction of which is desired; indeed, the possibilities which lie before the well-trained chemist and physicist are unlimited in number and unbounded in scope, while the effect of their application upon the welfare of mankind must await future determination.

The learned man, Admiral Braisted, who is now your president and director, has wide vision for the future of the Philadelphia School of Pharmacy and Science; indeed, I do not hesitate to say that he is a dreamer, and I use this term in no derogatory sense. Every great project, whether it be educational, political, economical, or scientific, is the product of mind activity. All these things must be visions or dreams before they are cast into realities, and when I say that your worthy president is a dreamer, my intention is to confer upon him a high compliment. He who has never built a castle in the air never builds a cottage on the earth. Without dreams there would be no reality. Dreams, such as I speak of, are the light waves which point out possible paths through the forests of the future, some of which surely lead to fertile lands. Your president desires to see this college expand greatly in facilities and in accomplishments, and I see no reason why his dream does not rest upon a substantial basis. There is here ample opportunity for the man of wealth to give of his excess in order that the condition of life among his fellow-men

might be improved. I am sure that there has never been a time when the intelligent public, both individually and collectively, has been so appreciative of scientific research as at present. The world-wrecking war through which we have passed, was a combat between German and Allied sciences, in which the latter finally overthrew the former. The war was a demonstration on a world-wide scale of the necessity for the national protection and help of science. With therapeutic agents, with disinfectants of great effectiveness, with vaccines and serums of specific action, produced for the most part by pharmaceutical processes and as a result of pharmacologic investigations, the medical corps of the several armies maintained a degree of health in the field hitherto unknown in the annals of war, protected the soldier against possible infection, and restored a large percentage of the injured to the fighting line. All of these things were demonstrated on the greatest stage the world has ever known. The various medical cults, the so-called Christian healer—those who would make us believe that they are able to work miracles in the prevention or cure of disease, were not found with the soldiers in camp, on the sea, or on the firing line. Scientific medicine, armed with the products of the highest pharmaceutical skill, demonstrated its value, and, as a consequence, wealthy individuals are today giving money in large sums to medical schools, to medical research institutions, to medical investigations, including those that are concerned in the production of more efficient therapeutic agents. I am sure that at no time in the history of the world has science, especially applied science, been the recipient of larger donations from private wealth than at present. It is only necessary for a physician or a group of physicians of good repute to appeal for private aid in order to foster some beneficent research, to secure all that is asked. This is true not only of private wealth, but it is also true of public aid along the same lines. Apparently, Congress is willing to vote millions on a fifty-fifty proposition to aid states in taking care of the physical and health needs of the people. Just now there seems to be no limit to the sums demanded for the ex-soldier, both the physically disabled and those in sound health. Several States have already provided for liberal bonuses to all, and our Congress is apparently just now on the eve of pouring out more millions. State legislatures are supporting the scientific departments of their universities, including both medicine and pharmacy where these exist, with a liberality hitherto unknown.

In a spirit of great generosity the state is providing for the physical needs of the unfortunate of every class. State boards of health are receiving liberal appropriations and are being given wider authority. Vaccines, antitoxins and antisyphilitic preparations are being distributed with the greatest liberality. The amount of money that has been spent since 1917 by the National Government, by some States, and by certain municipalities in dealing with the venereal diseases can be designated as liberal, and in some instances it would hardly be an exaggeration to say that it has been extravagant. Cities and rural communities are building and equipping hospitals and demanding that all citizens shall enjoy the benefits of the most advanced scientific medicine, whether it be preventive or curative. Scientific research, especially that which pertains to pharmacy and medicine, until a few years ago a mendicant begging a few pennies at the doors of private wealth and in legislative halls, is now the frequent recipient of great gifts from both private and public sources. I am sure that there are in this country holders of large wealth which has been gained by scientific discovery of therapeutic agents, and I advise that the president of this college apply to these men and to other men of wealth, specifying the possibilities that lie within the reach of this institution and calling upon them for abundant endowment. I believe that such an appeal will not be in vain, and with adequate facilities for research no one can foretell how rapidly or in just what direction progress will be made, but, that it will come, and having arrived will be a benefit to all, there can be no doubt.

I cannot permit this opportunity to pass without giving a few words of special advice to the members of the graduating class. I presume that during your college course you have become familiar with the basic facts of the fundamental sciences—physics, chemistry, botany and biology. Upon these all science rests. Continue your broad reading; keep up your interest in the fundamentals, but at the same time select one line of study, learn all that is to be learned about this subject, which, by the way, must not be too broad, and then go on in your investigations and know more about it than any one else knows; in other words, be not only a consumer, but be also a producer. The world needs scientific men with broad fundamental training, and in addition to this, the world needs the expert,—the discoverer, the explorer, the man who opens up new continents. I could have no greater satisfaction than to be assured that at least one of your number may make a real contribution to scientific knowledge.

THE EVOLUTION OF CHEMICAL TERMINOLOGY. III. THE "MICELLA."

By James F. Couch.

The riddle of life has challenged the intellectual efforts of man from the earliest periods of which we have any records. The terrible dread of eternal death has impelled him anxiously to seek for information and to question every phenomenon which might conceal an answer to the enigma. The development of Mysticism and Animism in primitive communities demonstrates the exaggerated authority which primeval man was willing to confer upon any fakir who claimed superhuman insight into this as well as into other mysteries. The savage cowers in superstitious awe before any man or object that may seem intimately connected with events beyond mere human understanding. In all history, even to the present, this element in human nature has played a most important rôle. It appears that the earliest forms of religious ceremonial were merely methods for the appeasing of the wrath or congenital hostility of the powers of darkness who ruled over life and death and who were normally malevolent towards the human race. In all of the primitive religions the gods to be feared are most prominently placed; the benignant spirits are either wholly missing or are subordinate.

A partial and palliative answer to the riddle of life was developed by the Greek philosophers of the Socratic and Platonic school in their theory of the immortality of the soul. Their conclusions, based upon pure reason, have proved satisfactory to the majority of mankind and have been incorporated into practically all of the extant dogmatic systems. Another metaphysical solution of the age-old problem is found in the doctrine of regeneration, which is so prominent in certain of the oriental theologies. Our science has now made us familiar with the fact that certain unicellular organisms are immortal and that death is the price we pay for having evolved and for having developed specialized types of tissue cells, and special organs.

As the dawn of modern time was struggling feebly through the dissolving clouds of the Middle Ages, the microscope was invented. This instrument permitted the curiosity of man to penetrate into the structure of living tissues and the discovery of the cell resulted. Widespread application of this instrument in research determined

the cellular structure of all living things and the doctrine that the cell is the basis of living matter was generally accepted. Further investigation, especially in recent times, has penetrated into the interior of the cell and we now know that this unit is very complex.

Reflection made it clear that the evidence demands the existence of a unit of living matter smaller than the cell but larger than the physicist's molecule. This was first suggested by Henle in 1841, and has been accepted by most cytologists. A number of names for a hypothetical ultramicroscopical vital unit have been proposed,[1] "physiological units" (Spenser), "gemmules" (Darwin), "pangens" (De Vries), "Plasomes" (Weisner), "micellæ" (Nägeli), "plastidules" (Häckel and Elssberg), "inotagmata" (Englemann), "biophores" (Weismann), "bioplasts" (Beale), "somacules" (Foster), "idioblasts" (Hertwig), "idiosomes" (Whitman), "biogens" (Verworn), "microzymas" (Béchamp and Ester) and "gemmæ" (Haacke).

Of the terms listed above, one is of especial interest to students of chemical terminology. The term "micellæ" proposed by Nägeli in 1877 has been employed by the botanists. Today it holds an important place in colloid chemistry as the name for the ultimate colloidal particle. It is destined to even greater importance for it is being used as a base upon which is constructed the newer theories of life and death, of disease, immunity, and anaphylaxis, of development, growth, and inheritance. The "micella" is not only the ultimate particle of colloidal matter; it is the ultimate living thing.

It is the purpose of this paper to point out two sources of confusion and ambiguity which have already attached themselves to this term.[2]

Let us first consider the spelling of the term. The standard English dictionaries are all in agreement in the use of the form "micella" for the singular and "micellæ" for the plural. This usage is followed by the majority of writers and may be considered as established in English literature. The forms "micell—micelles" and "micelle—micelles" are, however, also used especially by those who have become acquainted with the term through French literature. The adjectival form of the term is "micellar," but the form "micellu-

[1] E. B. Wilson, "The Cell in Development and Inheritance." New York, 1900; p. 291.

[2] Earlier papers on Chemical Terminology may be found in this Journal, Vol. 94, pp. 92, 343.

lar" is also found in the literature, though the natural form "micellary" which seems to be the proper form from grammatical rules, does not appear.

This formal confusion in English literature appears to have been the result of an error the responsibility for which cannot be fixed by the writer. The term coined by Nägeli is "Micell" [3] and, being neuter, was rendered "das Micell" with the plural form, "die Micelle." Out of this plural all the confusion has apparently arisen. The plural form is the one most frequently used in the literature, for from the nature of the "micellæ," they are usually spoken of collectively; the single "micella" is seldom referred to. Just as the word molecules is more frequently used than the word molecule. The German plural form "Micelle" is pronounced "micella" to English ears and this fact seems to account for the present English word.

Nägeli coined the term as a diminutive of the Latin "mica"—crumb, particle, bit, and gave the Latin form as "micellum." This is a neuter noun of the second declension whose plural would be "micella." The present English word is a feminine noun of the first declension whose nominative singular is identical with the nominative plural of Nägeli's micellum.

The French use the form "la micelle—les micelles," exhibiting, it must be confessed, much better judgment than we. The adjectival form in use in France is "micellaire," that employed by Nägeli is "micellar."

The English form "micella—micellæ" is, consequently, objectionable and it appears likely that chemists will in the future use the term "micelle" already introduced into chemical literature. To make a characteristic English term the writer would suggest the form "micel—micels" with the adjectival form "micellary."

A much more serious difficulty, however, than this question of orthography arises in the various meanings which are given to the term. These are all closely allied to the original idea of Nägeli, but differ in important details and constitute a source of confusion.

Nägeli conceived the micel as a crystalline molecule-group which may be more or less hydrated. He says [4] "The internal structure of the micel is crystalline, while the external aspect may exhibit all

[3] Theorie der Gärung. München, 1879; p. 121.

[4] *Op. cit.*, p. 123.

feasible forms." In the "Mechanico-Physiological Theory of Evolution" he says further: "Certain organic compounds, among them albumen, are neither soluble, despite their great affinity for water nor are they fusible, and hence are produced in the micellar form. These compounds are formed in water, where the molecules that arise immediately adjoining each other arrange themselves into incipient crystals, or micellæ. Only such of the molecules as are formed subsequently and come into contact with a micella contribute to its increase in size, while the others, on account of their insolubility, produce new micellæ." [5]

Zgismondy interprets Nägeli thus:[6] "Nägeli pictures distensible bodies as small, anisotropic, crystal-like molecular complexes or tiny crystals, that cause the double refraction because of their orienta-

[6] "Chemistry of Colloids." By Richard Zgismondy. Translated by Ellwood B. Spear. New York, 1917; p. 68.

tion. According to this theory the distension is occasioned by the penetration of water into the micellular walls in such a manner that the micells are surrounded by a layer of water." In the same work, page 77, another notion of the micel is stated: "Duclaux . . . has proposed the name 'Micells' for the ultramicrons together with their adsorbed molecules and dissociation products; while the surrounding medium he calls the intermicellular liquid."

This idea of Duclaux is similar to that of Malfitano.[7] "As for me, I have been guided in all these researches by the idea that colloids are double compounds formed of insoluble molecules associated with 1 mol of electrolyte and forming complex ions according to the scheme $(MnA)^{\pm}$ $B^{\pm}$."

Duclaux says,[8] "Experience has shown that the particles of a colloid, or micels, are formed of a small mass of insoluble agglomerated matter, electrically charged by one or more ions (the aggregate of nucleus and of these ions forming the granule) and covered on the outside by a layer or envelope, continuous or discontinuous, of ions with a contrary sign."

"In ferric hydrate prepared by hydrolysis of the chloride, the granule is formed of molecules of Fe_2O_3 charged by Fe ions and the external ions are the chloride ions."

[5] The quotation is from V. A. Clark's Summary. Chicago, 1898; p. 2.

[7] *Compt. Rend.*, 148, 1045-47 (1909).

[8] *J. de Chim. Phys.* 7, 405 (1909).

"In the hydrate of Thorium, prepared by parting the nitrate, the granule is formed of molecules of ThO_2 charged by ions of Th and the external ions are the nitrate ions."

J. W. McBain after many years' study of the physical chemistry of concentrated soap solutions has developed a theory in which he incorporates a definite conception of the micel which differs, however, in some very essential details from the conception of the German and French investigators.[9] The following quotations taken in order from the very interesting paper of 1920 will exhibit McBain's idea of the micel.

"Colloidal electrolytes are salts in which an ion has been replaced by a heavily hydrated polyvalent micelle that carries an equivalent sum-total of electrical charges and conducts electricity just as well or even better than the ion it replaces."

"In the cases of proteins and soaps at high concentration, the undissociated substance is an ordinary colloid while the organic ion is a micelle."

"This refers to the undissociated colloid as well as to the colloidal ion or ionic micelle."

"The conception of these highly mobile heavily hydrated micelle(s), outlined above, was originated by McBain in a general discussion on colloids and viscosity held by the Faraday Society in 1913. It was put forward to remove one of the chief difficulties in interpreting the properties of acid and alkali albumens, since it reconciled their enormous viscosity with their quite good conductivity."

"What is essentially new in the conception of a mobile micelle here presented is the mechanism by which the micelle is built up around an aggregate of simple stearate ions which still retain their original electrical charges."

"Various views may well be taken with regard to the formation of the ionic micelle. For instance, the simplest is to consider it as an agglomeration of palmitate ions, heavily weighted by water, a complex solvate:

$$P_m^{n(-)}.\ m\ H_2O$$

"The water sphere, collected around these enormous electrical charges, is as inevitable as the collection of a droplet of water round

[9] *Trans Faraday Soc.* 1913, Vol. 9, 99; McBain and Salmon, *J. Am. Chem. Soc.* 42, 426-60 (1920).

an electron in saturated water vapor. Probably some at least of the undissociated colloid would also join in (see below).

"The self-same micelle can also be formulated thus:

$$(HP)_n.\ (OH)_m^{n(-)}.\ (H_2O)_{m-n}.$$

Here the assumption is complete hydrolysis of the palmitate ion followed by complete adsorption of the hydroxyl ions by the fatty acid."

In 1913 McBain spoke of "highly charged colloidal aggregates, micelles, or 'colloidal ions,'" and of "excessive hydration of these micelles (possibly as a consequence of their electrical charges)."

To sum up, McBain regards the micel as a colloidal ion formed of an aggregation of simpler ions and complicated by adsorbed hydroxyl ions and by excessive hydration. The micel is not a unit of colloidal matter, but appears only when the colloid is dissociated and is ionic. It is also not conceived as living matter and this is quite at variance with the ideas of the biologists who use the term.

It is in this latter sense that the term will probably come into common use for the conception of the micel as the ultimate particle of living matter is the view held by the French bacteriologists who are now publishing their revolutionary theories upon the origin, evolution and nature of disease as well as upon the normal physiological processes.

Their ideas are very definite: Danysz [10] states, "The chemical and physiological unit of the plasma is the 'micelle' which possesses for each animal or vegetable species a particular and constant chemical and osmotic equilibrium."

Lumiére develops the idea more in detail:[11] "All colloid material is formed of micels, animated by the Brownian movement, which remain in suspension in the intermicellary liquid. These micels are themselves constructed of a granule or nucelus, that is to say, by a certain number of molecules of a body which is insoluble in the intermicellary medium, and covered with a layer of another and a soluble substance, but which occurs fixed by adsorption, this last being the active portion of the micel."

Speaking of colloidal cupric ferrocyanide he says: "The micel presents a complex organization; it consists of a principal mass

[10] "The Evolution of Disease." Trans. by F. M. Rackemann. Philadelphia and New York, 1912; p. 133.

[11] *Rôle des Colloïdes chez les Êtres Vivantes.* Paris, 1921; pp. 147, 4, 5.

composed of a variable number of molecules of insoluble cupric ferrocyanide, forming a granule, a kind of nucleus possessing a definite electric charge and enveloped by a layer of potassium ferrocyanide, of which the electric charge is of opposite sign."

"From the point of view of weight the granule is by far the most important part of the micel; but it constitutes only a heap of insoluble and inert molecules, of which the tendency to chemical reactions is reduced, while the elements which surround it although they form but a minimal fraction of the micellary arrangement are the active portion of it which principally takes part in the transformations of the colloid."

It is apparent that the view of the micel expressed by Lumiére is of much more universal application than the idea developed by McBain. The latter, in restricting the term to ionized units, has left the true micel, the ultimate particle of colloidal matter, without a name. The former view, however, incorporates the ideas, with modifications, of Nägeli and of the biologists who have used the term during the past forty-odd years. It applies it to every colloidal system and will, without doubt, be extensively used by physiologists and pathologists. Consequently there is certain to arise undesirable conflict between the meanings applied to the same term by biochemists and physical chemists. It is very desirable to avoid this confusion and to define the term exactly. The priority of the use of the term in the sense that Lumiére employs it is indisputable; this fact and the wide applicability of that conception appears to warrant us in refusing to limit the word micel to ionic aggregates only. Therefore it is suggested that the term micel be defined:

> A hypothetical unit of colloidal matter postulated as formed of a nucleus of several molecules of an insoluble compound, and coated with a layer of adsorbed ionized or non-ionized material, the whole combined with a large number of molecules of the continuous phase in which the micel occurs.

SUMMARY.

The history of the term "micella" is related. The various conceptions of the nature of this unit are considered and the conflicting views already published are stated. It is shown that the modern English form of the term is erroneous; that it not only does not truly

represent Nägeli's original terminology, but that it also violates classical good taste. The probability of confusion arising in chemical literature through the use of the term in essentially different senses is pointed out. An acceptable definition for the term is suggested.

EXAMINATION OF THE FRUIT OF SAMUELA CARNEROSANA TRELEASE.

By O. F. Black and J. W. Kelly.

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Recently there came into the hands of the writers some specimens of the fruit of *Samuela carnerosana,* which had been received by the Department of State from the United States Consul stationed at Saltillo, Mexico, where the plant is abundant. Request was made for information as to the possible medicinal properties of the seeds, and the value of the fruit as a whole as a raw material for the production of alcohol.

Since no reference was found in the literature to the chemical properties of this fruit, the sample in hand was subjected to a preliminary examination, the results of which are summarized in the following notes.

A very complete botanical description of *Samuela carnerosana* together with illustrations of the whole tree, the flowers and the fruit, is given in the Thirteenth Annual Report of the Missouri Botanical Garden for 1902. The tree is closely related to the Yuccas, in respect to general habit, floral plan and fruit and seed characteristics, but is distinguished from all other yuccas by having the perianth distinctly tubular and gamophyllous below, with the stamens becoming free only at its throat. These characteristics which deviate widely from all known baccate yuccas, have caused it to be separated into a new genus. The fruits are described as greenish yellow, though sometimes tinged with red or purple, and the soft, sweet pulp is pale in color. They are eaten by birds and rodents, and domestic animals also are said to like them. As the fruits are quite sweet they are enjoyed by the Indian and Mexican children, who call them dates or figs.

The sample of fruit, as received, was in a partially dried con-

dition and slightly worm-eaten. It was, therefore, impossible to make a total moisture determination. The seeds were readily separated from the pods by splitting the latter lengthwise with a knife. Both seeds and pods were dried at 100-110° C. until the weights became constant. The dried pods were found to weigh 190 grams and the seeds 70 grams, or approximately 70 and 30 per cent., respectively, of the dried fruit.

The seeds, which had the shape of flattened disks, were mostly black in color with a few immature light yellow ones. They were ground in a mill to moderate fineness and a portion tested for alkaloids by digestion in Prolius' solution, followed by the usual procedure, but with negative results. The main portion was then subjected to the action of selective solvents. Ether removed a light yellow oil, together with a small quantity of lecithin. The oil weighed 15 grams, or about 20 per cent. of the dry seeds. It is practically tasteless and odorless and may possess medicinal properties. It gave the following physical constants: Specific gravity, 0.9265 at 22° C.; iodine number, 125.6; acid number, 5.13; saponification value, 192.83; index of refraction, 1.4710°; ester number, 187.7. Choloroform extracted a small quantity (2 grams, or about three per cent of the material) of an impure, wax-like product, light green in color, which melted at 215° with partial decomposition, and showed no properties interesting enough to warrant further investigation. Alcohol dissolved out a white, amorphous solid compound, which was readily soluble in hot alcohol, and practically insoluble in cold, thus being easily obtained in a pure condition. It foamed strongly when shaken with water and gave other tests characteristic of a saponin. Compounds of this type are commonly of a poisonous nature, and some have therapeutic qualities. The compound was not found to be highly toxic, as a small quantity injected into a mouse caused the animal only temporary discomfort. Further investigation of this compound might show that it has some valuable qualities, and the ease with which it can be obtained and purified, together with the considerable quantity (about 10 per cent.) contained in the seeds, would make it a hopeful subject for further study.

The pods were amber in color and dried to a horny consistency. The taste was sweet, but the flavor insipid. Weighed samples showed 4.65 per cent. of ash and 0.109 per cent. of nitrogen. Analysis for carbohydrates gave 4.30 per cent. of starch, 62.2 per cent. of reducing

sugars (calculated as dextrose), and 3.80 per cent. of non-reducing sugars (calculated as sucrose). That the reducing sugars are largely composed of fruit sugar was indicated by the melting point and crystalline form of the osazone and also by the strong laevo rotation of the solution when tested in the polariscope.

From the high percentage of soluble sugar, as given above, it would seem that this fruit might be valuable material for the production of alcohol. Approximately 50 per cent. of the dried, whole fruit was found to consist of fermentable carbohydrates. It follows that a ton of dry fruit would give a theoretical yield of 500 pounds of alcohol, although in practice it would naturally fall short of that amount. Such calculations must be regarded with reserve, however, and there is the probability that during the long period which elapsed between the gathering and the analysis of the sample in question the character of the carbohydrates present may have undergone appreciable changes.

The fruit is very rich in pectinous material, which would make it especially suited to the manufacture of jams and jellies, were it not for the lack of flavor. It might, however, be used for this purpose in connection with other fruits which have more characteristic flavor, but which are lacking in pectin.

ON THE STABILITY OF STROPHANTHUS EXTRACTS.*

CLAYRE A. POMEROY and FREDERICK W. HEYL.

The growing use of aqueous solutions of strophanthin under critical conditions where the failure of action would be serious or even fatal, is perhaps due to the fact that it serves its purpose better than the various digitalis extracts which were formerly more extensively used for this purpose. The composition of these were chemically unknown and variable. This variability is increased because of instability. However difficult it may be to secure the therapeutic action of strophanthus *per os*, either because of the difficult absorption or the destructive hydrolytic cleavage by means of the acidity of the gastric juice,[1] the fact is plain that hypodermatically,

*Contribution from the Laboratories of The Upjohn Company.

[1] Johannessohn, *Arch. exp. Path. Pharm.*, *78*, 83 (1914).

rapid absorption ensues, and the desired therapeutic effects are secured.

In order to help prevent this desirable drug from being thrown into disrepute through lack of pharmaceutical control, an early consideration of the stability of this class of pharmaceuticals is desirable. Some work has been reported by Holste,[2] who found that a solution of k-strophanthin (Boehringer) in ampoules, had lost most of its activity after a year; g-strophanthin was found to be stable.

It is necessary to have a complete understanding of the present condition of Strophanthus chemistry in order not to become confused with the various products. Three drugs are found in commerce. Two are official, *Strophanthus Kombe* and *S. Hispidus*. The third is unofficial, *S. gratus*.

From the *S. Kombé*, a crystalline glucoside has been isolated.[3] This is known as crystalline strophanthin Kombé. It contains water of crystallization and when dried melts at 178-179°. It agrees in composition to the formula $C_{40}H_{56}O_{15}.3H_2O$. This product separates directly (0.4%), when a defecated 70% alcoholic extract of the deoleated drug is concentrated. The drug contains in larger quantity an amorphous strophanthin. This amorphous product has the same toxicity as the crystalline substance. The commercial strophanthin is prepared by precipitation with tannin and is a mixture in which the amorphous glucoside predominates.

From *S. hispidus* no crystalline glucoside has been isolated, but the amorphous product obtained by Heffter and Sachs[4] by salting out defecated alcoholic extracts after distilling off the alcohol amounted to 1.7% of the drug. It is known as strophanthin hispidus. This preparation is exceedingly similar to the amorphous strophanthin K., equals it in toxicity, and yields the same "genin" (strophanthidin) on hydrolysis ($C_{27}H_{38}O_7$).

The sugar residues are apparently alike. In respect to the sugar linking these amorphous preparations differ from the crystalline product.

Concerning *Strophanthin gratus* or Ouabain from the unofficial drug; this is a crystalline rhamnoside having the composition $C_{30}H_{46}O_{12}$. This is said to be present in a number of varieties.[5] It is three times as toxic as the previously mentioned products, and is used as a standard for the one hour frog method.

Our interest centred in the official drug, and from samples of this material various preparations were made and studied with

[2] *Zeit. exp. Path. u. Ther.*, *19*, 153 (1917); (through Physiological Abstracts).

[3] Brauns and Clossen. *J. Am. Pharm. Assoc.*, *2*, 605 (1913).

[4] *Biochem. Zeit.*, *40*, 83 (1912).

[5] *Biochem. Handlexicon*, *2*, 685.

respect to stability. One solution of the unofficial glucoside ouabain was also prepared and stored.

The results of this investigation, using the official one-hour frog method may be summarized as follows:

(1) Strophanthus seed varies widely in potency, but tinctures retain their original strength, showing marked stability.

(2) Dilute aqueous galenical solutions prepared for hypodermic or intravenous injection, containing the mixed strophanthins deteriorate slowly.

(3) They should be discarded after about one year, although approximately 70 per cent. of the activity is retained at that time.

(4) Crystalline ouabain stored in dilute saline solution (of hypodermic strength) showed a small rate of deterioration.

EXPERIMENTAL.

Tincture Stability. Strophanthus is a most variable drug. Not only is there a large number of varieties, but the range of toxicity of these varieties is very great. We have stored a number of samples of strophanthus tinctures (10 per cent.) which were made by the U. S. P. process, from samples of the seed submitted. These were then tested at different periods to observe the deterioration, if any. The results prove the stability of the alcoholic extracts regardless of the original activity of the drug.

Tincture No. 1.

Date	*M. S. D.*	*Per cent.*	*Period, Months*
1-12-18	0.0002	30	
8-3-18	0.0003	20	7
9-25-18	0.0002	30	8

Tincture No. 2.

Date	*M. S. D.*	*Per cent.*	*Period, Months*
5-1-17	0.00018	33	
7-20-18	0.000193	31	14
5-19-22	0.000200	30	5 yrs.

Tincture No. 3.

Date	*M. S. D.*	*Per cent.*	*Period, Months*
8-10-17	0.0000530	113	
7-20-18	0.0000536	112	11
8-7-18	0.0000540	111	12
5-19-22	0.000060	100	57 mo.

Tincture No. 4.

Date	*M. S. D.*	*Per cent.*	*Period, Months*
8-18-18	0.000083	72	
10-10-18	0.000080	75	2
5-19-22	0.000075	80	3 yrs. 9 mo.

Aqueous Solutions in Ampoules. For hypodermic administration, a saline solution of the mixed amorphous and crystalline strophanthin Kombé from the official drug may be obtained. This preparation will be desirable, however, only when the process is begun with a drug of high potency, thus reducing to a minimum traces of other extractive matter which will accompany the glucoside fraction. By using a drug of the U. S. P. standard, there would probably be less foreign matter in such an aqueous solution than there would be in the amorphous glucosides prepared by the tannic acid precipitation process.

The possibility of deterioration presents the chief difficulty. In order to investigate the pharmaceutical aspects of deterioration, a study was made of the rate of deterioration of galenical saline strophanthin solutions diluted to such a strength that the minimum lethal dose was 0.0005 cc. per gram of frog.

This work was begun with a high grade strophanthus from which a tincture was prepared by the U. S. P. process (200 g. in 2000 cc.). The assay was as follows:

Dose per gm.	*Result*	*Dose per gm.*	*Result*
0.00006	+	0.00009	+
0.00007	—	0.000095	+
0.00008	—	0.000100	+
0.000085	—		

The frogs required 0.0_67 g. ouabain as M. L. D.

Therefore the tincture of Strophanthus had an M. L. D. of 0.000064 cc. (94 per cent.).

The tincture was distilled in a vacuum to recover alcohol and water saturated with chlorbutanol was added to make the volume 6.1. The solution (No. 1) was filtered and analyzed (1-12-18).

Dose per gm.	*Result*
.00015	—
.00020	—
.00025	— —
.00030	+ + +
.00035	+

The frogs required 0.0675 g. ouabain as M. L. D. Therefore, the M. S. D. = 0.00020 cc. per gram frog.

By calculation the final dilution was now made and the solution brought to a standard: M. S. D. = 0.0005 cc. per gram frog. (volume = 15 liters). Enough sodium chloride was added to make the solution isotonic (0.85 per cent.) The product was filtered through porcelain and collected in sterile receivers in the usual manner. Part was ampouled into 1 mil. containers and the remainder put aside on ice. The material in ampoules (No. 3850) was assayed as follows:

Date	*M. S. D. Mils.*	*Toxicity, Per cent.*	*Period in Months*
1-15-18	0.0005	100	
5-25-18	0.00057	88	4
7-20-18	0.00060	83	6
8-17-18	0.00071	70	7
10-22-18	0.00080	62.5	9
2-23-19	0.00080	62.5	13
4-7-19	0.00100	50.0	15
8-4-19	0.00111	45.0	19
11-14-21	0.00143	35.0	46

The second portion which had been put aside in the ice chest was ampouled about four months later than the above described (No. 4005):

Date	*M. S. D. Mils.*	*Toxicity, Per cent.*	*Period in Months*
5-28-18	0.00057	88	4
4-7-19	0.00111	45	15
8-5-19	0.00111	45	19

From these results it is evident that these very dilute solutions of the glucosides deteriorate to about half their original activity in fifteen to eighteen months; and that storage at low temperaure does not necessarily favorably influence the rate of deterioration.

A part of the more concentrated solution (M. S. D. = 0.0002 cc. per gram frog) was studied as to deterioration (No. 1).

Date	*M. S. D. Mils.*	*Toxicity, Per cent.*	*Period in Months*
1-12-18	0.00020	100	
8-3-18	0.00030	66	7
4-6-19	0.00040	50	15
8-4-19	0.00040	50	19

It is, therefore, apparent that an increased concentration suffered loss at the same rate as the more dilute solution.

A further experiment on the influence of temperature on the rate of deterioration was carried out in the same manner as above described (No. 4165).

Date	*M. S. D. Mils.*	*Toxicity, Per cent.*	*Period in Months*
10-15-19	0.000476	105	
4-30-20	0.000555	90	6
11-9-21	0.000833	60	25

Another portion of the same lot was kept in an ice chest. It assayed as follows:

Date	*M. S. D. Mils.*	*Toxicity, Per cent.*	*Period in Months*
10-15-19	0.000476	105	
5-1-20	0.000526	95	6½
11-10-21	0.000714	70	25

Here again the loss on deterioration agrees with the first determination. Observations on the effect of hydrogen-ion concentration on deterioration are found in a paper [6] by Levy and Cullen. Data was obtained on the same subject by the use of the cat method for assay. Stability of heat sterilized solutions for a five months' period is shown provided the pH is 7.0. Deterioration is noted in alkaline, but not in neutral or slightly acid (pH = 5.0) solutions. As this point had not been considered by us the hydrogen-ion concentrations of the above solutions were determined by the colorimetric method of Clark and Lubs, and it was shown that alkalinity was not a factor in our results.

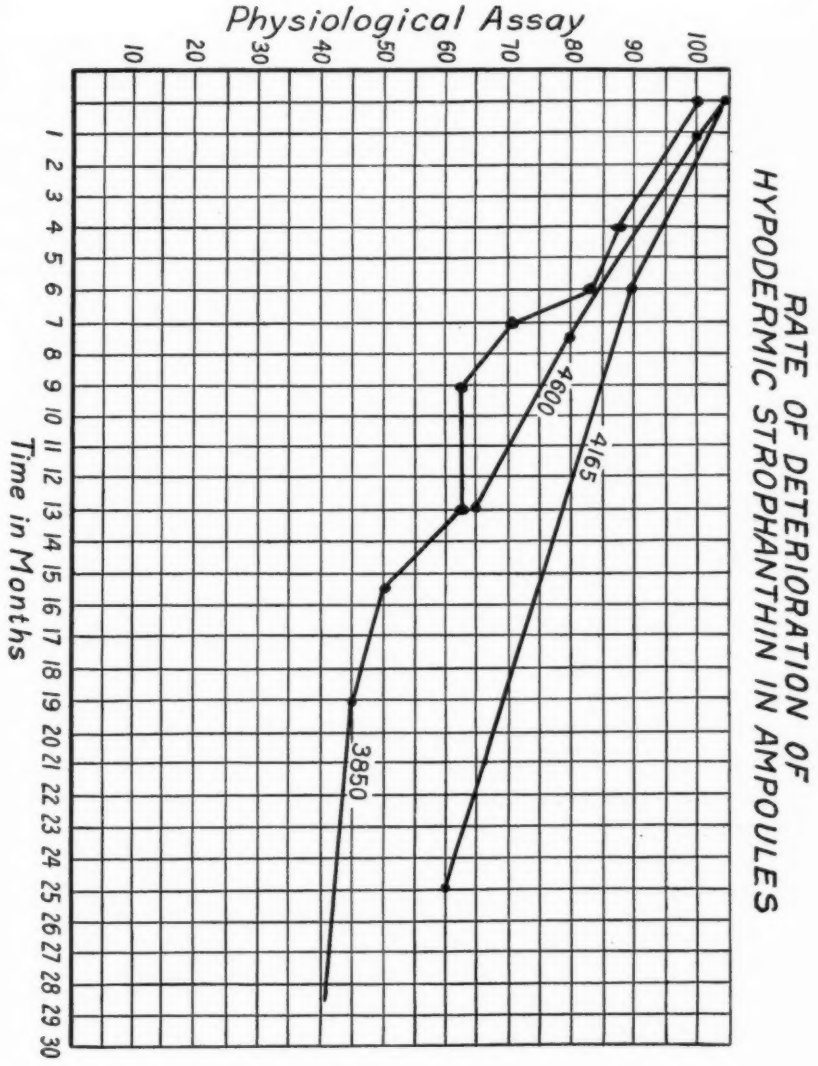
Nos. 3850, 4005, 1,4165 :pH found, 5.8, 6.0, 5.4, 5.6 respectively. The plant extractives yield in this case a slightly acidic solution.

As was previously pointed out,[7] there is considerable discrepancy in results obtained on the rate of deterioration of infusion of Digitalis, depending apparently on whether the cat or frog method is used for the assay. Our results on Strophanthin solutions likewise appear contrary to those of the above-mentioned investigators.

A carefully neutralized (pH = 7.0) Strophanthin solution was

[6] *Jour. Exp. Med., 31,* 267 (1920).
[7] *Am. J. Pharm., 92,* 394 (1920).

made by the addition of acid potassium phosphate and disodium hydrogen phosphate buffer solutions to a solution made as above described.



The M. S. D. of the solution was 0.0005 cc. per gram frog (No. 4600). It was analyzed as follows:

Date	*M. S. D. Mils.*	*Toxicity, Per cent.*	*Period in Months*
3-29-21	0.000476	105	
4-26-21	0.0005	100	1
11-15-21	0.000625	80	7½ (pH=7)
4-13-22	0.00077	65	13 (pH=7)

For the sake of comparison a solution (1-1000) of crystalline ouabain in physiological salt solution was prepared and diluted to the same standard strength as all the other preparations (M. S. D. = 0.0005 cc. per gm. frog). The solution ws rendered neutral as before with buffer solutions of acid potassium phosphate and disodium hydrogen phosphate.

Date	*M. S. D. Mils.*	*Toxicity, Per cent.*	*Period in Months*
4-30-21	0.0005	100	
11-15-21	0.00055	91	6½ (pH=7)
4-13-22	0.000583	86	12 (pH=7)

It will be observed, that so far as the galenical aqueous strophanthin extracts are concerned, that when the pH is lowered to 7, the solution exhibits a rate of deterioration of about the same order as when pH = 5.4. We would place a time limit on the usefulness of these solutions at about one year. They may be serviceable longer than this, for at this time about 70 per cent. of the activity is retained. The variability in the rate is probably due to variable mixtures of amorphous and crystalline glucosides obtained from different seeds.

In conclusion we wish to acknowledge the pharmacological assistance of Dr. J. M. Schmidt for many of the first assays.

Kalamazoo, Michigan.

ABSTRACTED AND REPRINTED ARTICLES

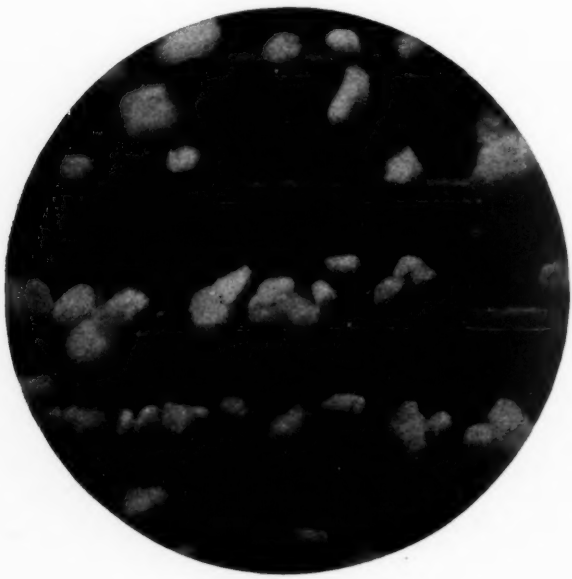
THE FINENESS AND BULK OF PIGMENTS.

Abstracted by DR. HENRY LEFFMANN.

The Educational Bureau of the Paint Manufacturers' Association of United States, co-operating with the National Varnish Manufacturers' Association, has established a laboratory for the study of the problems connected with these industries. The procedure is one of many indications of the useful development of systematized research, which has been so much needed in this country. The problems that modern industry faces are numerous and complex and can only be solved by organized methods and by considerable money outlay. The physics and chemistry are both of great importance in this field, and among the special methods the photomicrographic records are of material assistance.

Mr. Henry A. Gardner, in association with Harold Parks and Nils Pihlblad, has devoted much time to the study of fine powders under high magnification, and some of the results have been published in a special pamphlet from which this abstract has been taken. It has been found that the presence in a pigment of an appreciable amount of coarse particles will retard very much the speed of the production of a paint and increase materially the cost of grinding. It is also evident that in the case of remedies, such as calomel and bismuth subnitrate, which are difficultly soluble in water or the fluids of the body, the fineness of the powder will have considerable importance. It may be that the great trituration to which some homœopathic remedies are subjected increase materially their medicinal action. The ordinary works on pharmacognosy do not treat of these powders, but a comprehensive investigation of the commercial forms of them would be of interest and use. The method used for determining the percentage of coarse particles in a given powder is to screen the mass with a screen of 325 mesh upon which 25 grams of the sample are placed. The mass is washed in a stream, while the lumps are broken up by a soft brush. When all materials have

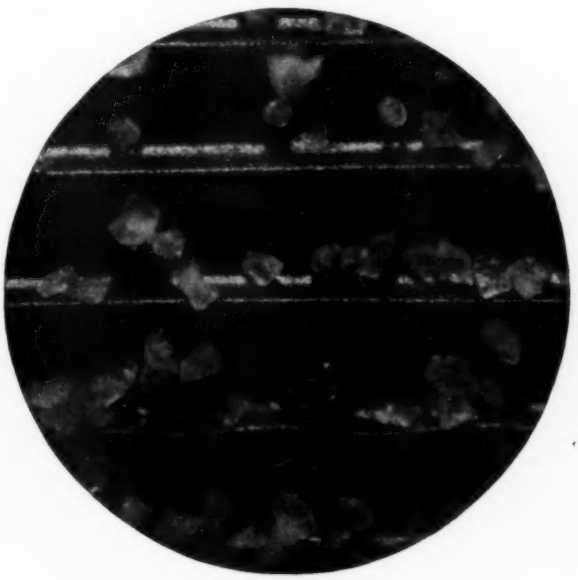
passed through that the mesh will allow, the screen with its residue is dried, weighed and the tare of the screen deducted. It is obvious however, that considerable differences in results with the same powder will be obtained by greater or less energetic use of the brush, so a definite end-point must be adopted. Gardner and his co-workers use a screen 3 inches in diameter made of wire cloth. These are capable of being placed on the pan of an ordinary balance. It is recommended that a number of screens be obtained, and one be set aside as a master screen for checking up the others. The Bureau of Standards has arranged to test screens to determine whether they conform to the United States standard sieve series. Remington, years ago, made a number of tests of screens offered in the market and found considerable irregularity. The thickness of the wire, of course, materially affects the real size of the mesh. The pamphlet gives in detail the methods pursued and discussions of the value of the results. Through the kindness of Mr. Gardner several of the blocks showing the microscopy of the powders have been loaned for use in connection with this article.



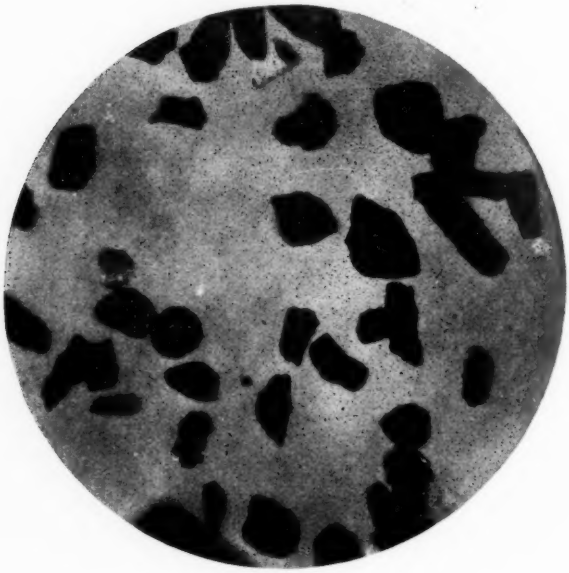
WHITE LEAD.

Courtesy of Henry A. Gardner.

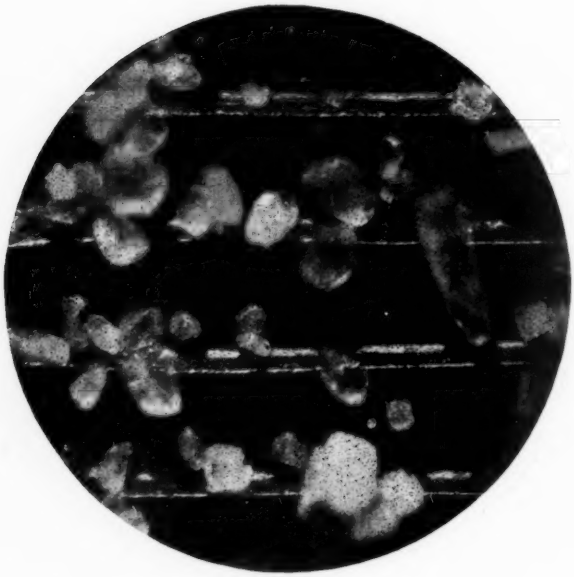
MERCURIC OXIDE
(globules of mercury were also present, but do not appear in the photograph).
Courtesy of Henry A. Gardner.



BARIUM SULPHATE.
Courtesy of Henry A. Gardner.



BONE BLACK.
Courtesy of Henry A. Gardner.



OCHRE.
Courtesy of Henry A. Gardner.

COMPOUND DIGESTIVE ELIXIR.*

By Ivor Griffith, Ph. M., Philadelphia.

"A therapeutic monstrosity and a pharmaceutic crime"—so was this elixir labelled by a professional satirist of the past decade. A monstrosity and a crime simply because the originator of this palatable elixir erred in theory at least by combining pancreatin and malt diastase (erswthile active only in alkaline media) with pepsin in an acid vehicle. And to add a finishing touch to the error, he also used a goodly portion of the enzyme killing alcohol, to further the elegance and the permanence of the preparation.

In the first instance, as is true of many other preparations of this kind, the elixir was only patterned after a proprietary, and if imitation is the sincerest form of flattery the original elixir, still in great vogue by virtue of its unremitting advertising and its no inconsiderable merit, is being greatly flattered to this day. For when the compilers of the third National Formulary decided to include the Compound Digestive Elixir in the official list of that authority they hardly expected for it the popular reception which it received at the hands of prescribing physicians.

This popularity came to it because of a combination of happy coincidences. Firstly, it boasted just the right shade of pleasing warmth, the red of an honest man's blood. Secondly, its odor, its bouquet and its taste, were delightful and oddly masked the noxious doses so often hidden among its molecules. And lastly, it was alleged by venturesome and opinionated pediatricians to be possessed of no mean merit as a stomachic and digestive in the treatment of disorders of that important part of the small child's anatomy. It helped to restore normalcy to the jaded stomachs of overfed babies, and to bring back equilibrium to small families whose first-born responded to colic impulses by singing alone but together the heroic sextette from "Lucia."

And any medicine that does this is entitled to a prominent place in the sun.

However, along came the new National Formulary Committee, and, because of certain theoretical considerations and in order to furnish professors of pharmacy some additional small talk, it promptly decided to forever disbar this horrid monstrosity from the revised

*Reprinted from *The Pennsylvania Pharmacist.*

edition. Thus with one fell stroke they expected that this elegant galenical freak would vanish with thin air.

But the best laid plans of mice and men "gang aft agley thegither" (which is Scotch for saying that the bottom dropped out of them). Doctors who had grown to love this ruddy elixir continued to prescribe it and the propaganda which the corner druggist had carried on when the elixir first became official, had taken deep root. So this elegant freak, now without a home or sponsor, manages to exist and carry on.

But it is no longer official, it is an outcast and outcasts have no codes of morals or ethics. So it is that we find no uniformity in the digestive elixirs that are still ruddy, for color is cheap, but are lacking in enzymes and alcohol, for these things are of worth. We venture to state that no two stores in a community supply a standard article, and that there is a greater variety of compound digestive elixirs parading the drug stores than there is of moonshine fluids stored in garages. Even the reputable drug manufacturers camouflage the issue, for none of them supplies in their catalog the accurate analysis of the succedaneum preparation, elixir of lactated pepsin, which they supply when compound digestive elixir is called for. They do say that it represents a "palatable combination containing 40 or 80 grains of lactated pepsin to each fluid ounce."

Just what lactated pepsin is one cannot quite see for elsewhere in the catalog it is vaguely described as a blended combination of pepsin, pancreatin and diastase with diluent. No figures of proportion are even given and one wonders whether this is an unimportant detail left to the judgment of the stock room employees whose stated proportions vary according to the state of the weather.

"If the doctor prescribes red brick dust it is the business of the pharmacist to prescribe standards for the article and to abide by them." So runs a statement attributed to Dr. Horatio Wood, Sr., and it is well said.

Irrespective, therefore, of the new restrictions proposed by the internal revenue authorities, who lay down prohibition rulings, and because of the persistent demand by doctors for this red elixir, the committee now functionating in revising the National Formulary is urged to re-introduce into that collection of worthy formulas the old formula for Compound Digestive Elixir, making no change in the name and omitting only the tincture of cudbear, replacing that with two drachms of powdered cudbear to the gallon.

SCIENTIFIC AND TECHNICAL ABSTRACTS

A STARCH INDICATOR SOLUTION.—After considerable experimenting with starch solutions and pastes a method was devised for preparing a compound containing starch which is very stable and not liable to decompose readily. The indicator was required to detect the presence of nitrites in water, for use in the Hübl and Wijs determinations, and to indicate the presence of free and combined iodine generally.

It was prepared as follows: Common household (rice) starch was boiled with about an equal weight of sodium carbonate in solution, and the resulting mixture allowed to cool. Concentrated hydrochloric acid was then added until all action had ceased and the liquid was distinctly acid. Pieces of granulated zinc were then placed in the liquid, and it was allowed to stand for about twenty-four hours. It was filtered when neutral.

When prepared from pure materials the solution is perfectly clear and colorless, but in most cases impurities in the starch give the indicator a yellow tinge.

A solution prepared in this way on July 8, 1921, still (March, 1922) gives a very distinct blue color when tested in the following manner: The starch solution (0.1 cc.) is placed in Nessler cylinder and diulted to 100 cc. with distilled water. The same quantity (0.1 cc.) of a 0.1 *N* iodine solution is then added, and the solution stirred with a glass rod.

Mucilage of Starch B. P., prepared from the same starch, when tested in the above manner, gave no reaction after keeping for ten days, whereas the other solution still reacts after keeping for over seven months.—(W. J. P., from the *Analyst*, April, 1922.)

DECOMPOSITION OF AMMONIUM NITRATE.—Interest in this subject has been developed of late, owing to the great explosion at Oppau, the cause of which has not been determined, or if determined by the German experts, has not been definitely published. Suggestions have been made that it was in part due to ammonium compounds. The

formula of ammonium nitrate indicates that it may be an explosive if the proper initiative is applied. At a moderate temperature it decomposes almost wholly into water and nitrous oxide, a procedure that has been used for many years on a very large scale for the manufacture of the well-known anesthetic. It has been noticed, however, that irregular reactions often take place, especially the formation of small amounts of nitric oxide, and for commercial purposes the gas is always carefully purified. H. L. Saunders (*Jour. Chem. Soc.*, April, 1922, 698) gives the results of careful studies of the decomposition of the salt, finding that over a range of from 210° to 260° C., the course of decomposition is unaltered, about 98 per cent. of the salt decomposing into nitrous oxide and water, but a small amount of free nitrogen is always present. At a temperature of 300° the decomposition occurs explosively, and large amounts of nitrogen are set free. The reactions under the explosive decomposition are quite different from those which occur at the lower temperatures (quiet decomposition), producing nitric oxide, nitrogen peroxide and nitrogen in the ratio 2:4:5. Chlorides, which are often present in commercial samples, influence very unfavorably the action, free chlorine being almost always found in the gas. Chlorides accelerate the evolution of gas. The higher the initial temperature of decomposition, the lower the proportion of nitrous oxide. A certain amount of liquid is obtained, which always contains nitric acid, and also hydrochloric when chlorides are present in the salt used. Sulphates are without special influence, and small amounts of sodium nitrate—a not infrequent impurity of the commercial salt—do not influence the decomposition below 250°.

H. L.

Platinum Conditions.—The enormous advance in the price of this metal in late years has proved very embarrassing to chemists and to several industries. This advance has unfortunately contributed to additional difficulty, because it has diverted the metal to a use for which it is really not adapted, namely jewelry. There is no reason to doubt that the practice of setting precious stones in platinum has been adopted because of the high cost of the material, for it has a poor lustre and does not set off the stone as well as gold. George F. Kunz has recently reviewed the conditions of the platinum supply and uses, and some of the data that he sets forth are here noted, being

taken from recent issues of the *Chemical News*. The industry is gradually emerging from the chaotic condition into which it was plunged by the war, and even the Russian sources are beginning to be active. A notable increase of production is also recorded in Colombia, the locality, by the way, in which the metal was first detected. The Colombia mines were actively exploited while the Russian mines were blocked, but American companies are now endeavoring to stabilize the South American sources. The price of the metal has fallen somewhat, though still very high. An increased demand for jewelry and dental work has arisen since the close of the war which tends to keep up price. In 1920, the consumption of platinum in the United States was 141,041 troy ounces, of which 57 per cent. was taken by jewelers, 19 per cent. by electrical industries, 11 per cent by dental industries, 10 per cent. by chemical operations, the remainder being distributed in minor lines.

Naturally, active search has been made for new platinum deposits, but so far no great rewards have come. Kunz states that the outlook for some Alaska exploitations is rather encouraging. In Colombia, the principal deposits are in the Atrato and San Juan rivers, but a third river is regarded as likely to yield a supply. The United States is about to pay Colombia a large sum as indemnity, and it is hoped that much of this will be used to develop some of the Colombian industries, especially the platinum deposits. Undoubtedly a marked fall in the cost of platinum will be of great advantage to chemists.

H. L.

MEDICAL AND PHARMACEUTICAL NOTES

ANTISEPTIC ACTION OF COAL-TAR DYES.—At a recent meeting of the Society of Chemical Industry at Manchester, the facts concerning the extraordinarily potent antiseptic properties possessed by many of the coal-tar dyes was discussed. Bechhold and Ehrlich, in 1906, studied the antiseptic action of halogen compounds of phenol and naphthol, and obtained results which show clearly the extraordinary variations in antiseptic action produced by slight changes in chemical constitution, and also the markedly specific action of some

compounds. These points are illustrated by stating the minimal lethal concentration for certain micro-organisms of three closely allied naphthol compounds: dibrombetanaphthol is fatal to *B. coli* in a concentration of 1 : 30,000, and to *B. diphtheriæ* in one of 1 : 40,000; tribrombetanaphthol kills *B. coli* in a concentration of 1 : 2,000, and *B. diphtheriæ* in one of 1 : 400,000; tetrabrombetanaphthol has a lethal action on *B. coli* in a concentration of 1 : 1,000, and on *B. diphtheriæ* in one of 1 : 200,000.—(*Jour. Amer. Med. Assoc.*, June, 1922.)

Identification of Alkaloids Under the Microscope From the Form of Their Picrate Crystals. B. E. Nelson and H. A. Leonard.—Alkaloids may frequently be identified by the crystalline form of their picrates, but, in preparing such crystals for microscopic examination, it is essential that the conditions shall be the same in all cases. The most convenient procedure is as follows: A slight excess of saturated picric acid solution is added to a solution of the alkaloid acidified with hydrochloric acid, in a test tube; the precipitate is centrifuged, washed slightly, dissolved in a minimum quantity of warm 95 per cent. alcohol in a water bath, and allowed to cool slowly in the bath, with further cooling, if necessary. After centrifuging, the mother liquor is poured off, and the crystals transferred to a ringed cell microscope slide. A second crop of crystals is obtained by warming and cooling the alcoholic solution, after dilution to 50 per cent. Crystals so obtained may be compared with those from known alkaloids. Drawings of the crystalline picrates of the following are given: Atropine, eucaine, cinchonidine, hydrastine, sparteine, brucine, nicotine, scopolamine, hyoscyamine, pilocarpine, cinchonine, strychnine, morphine, heroin, homatropine, physostigmine, codeine, cocaine, dionin, quinidine, berberine, quinine, aconitine, caffeine and theobromine.—(*J. Amer. Chem. Soc.*, 1922, 44, 379-373. Through *The Analyst.*)

H. E. C.

New Sources of Cantharidin. C. van Zijp.—Cantharidin, which, according to the Pharmacopœias, may be obtained from various species of *Cantharis* or *Mylabris*, has now been isolated from two other species of beetles indigenous to Java. *Horia debyi Fairm.* (= *Cissites testaceus auct.*) ranges in length from 16 to 30 mm., and

in breadth from 5 to 10 mm., and is of a brick-red color. The other species, *Cissites maxillosa*, is much greater in size, but of the same color. Cantharidin may be separated from the male or female, or from the eggs, by moistening the finely divided material with strong hydrochloric acid, followed by sublimation, and evaporation of any condensed acid by exposing the sublimate over unslaked lime. In addition to their vesicating property, m. p., and polarizing action upon light, the crystals may be identified by their behavior with baryta water.—(*Pharm. Weekblad.*, 1922, 59, 285-289. Through *The Analyst.*)

INSECT POWDER.—The Insecticide and Fungicide Board of the United States Department of Agriculture recognizes as insect powder an insecticide made from the powdered flower heads of *Chrysanthemum cinerariæfolium, C. roseum* and *C. Marshallii.* The authors discuss the history, cultivation, harvesting, preparation of the powder, its effect on insects and animals and its adulteration. A long list of substances which have been used to color and adulterate insect powder is included together with physiologic, microscopic and chemic methods for the detection of the genuineness of insect powders. The presence and approximate percentage of stems may be determined by estimating the nitrogen, phosphorous and crude fibre together with a qualitative ether-extract test (to determine color). The ash content is highest in closed flowers, next highest in open flowers, and lowest in the stems. The analyst can determine whether open or closed flowers have been used in the following ways: The presence of a large amount of pollen and the absence of fruit tissue indicate "closed flowers"; and conversely, the absence of much pollen and the presence of a large amount of fruit tissues indicate "open flowers." (2) Mixtures of flowers and stems are made up on the basis of lowest cost. By following the market prices on "closed" and "open" flowers and stems, the analyst can usually tell which has been used in preparing a mixture of flowers and stems. (3) From the intensity of the green color of the ether extract, after experience the amount of stems present can be told roughly. (4) The crude fibre determination, taken in connection with the intensity of the green color of the ether extract, general appearance of the powder and odor, serves as a good indicator as to whether or not the mixture is

composed of "open" flowers and stems or "closed" flowers and stems.

The results of a series of tests show that the insecticidal activity of the insect powder is due to a mixture of acids and esters.—(*U. S. Dept. Agric. Bull.*, 824, 1-100, Pl. I-IV, 1920. C. C. McDonnell, R. C. Roark and G. L. Keenan.)

HEBER W. YOUNGKEN.

THE ADULTERATION OF INSECT POWDER WITH POWDERED DAISY FLOWERS.—Of all the species of *Chrysanthemum, C. Leucanthemum* probably has been one of those most often utilized for the sophistication of insect powder and its presence in commercial insect flowers has been frequently detected by the authors. The uses, insecticidal action and chemistry are taken up. The results of a comparison of analyses of the different commercial grades of insect flowers ("open" and "closed") and insect flower stems with those of the flowers of *Chrysanthemum Leucanthemum* show that phosphorous, pentosans and ash are higher in the flowers of *C. Leucanthemum* than in those of *C. cinerariæfolium*. After presenting the gross structure and histology of daisy flowers, the authors state that a chemical analysis is insufficient to show adulteration of insect powder with daisy flowers. This adulteration can be definitely determined only by microscopic examination. Powdered daisy flowers are distinguished by the irregular dark-red fragments of the achene and the palisade-like cells comprising the costal tissue of the akene.—(*U. S. Dept. Agric. Bull.*, 795 1-12. 9 fig. 1919. R. C. Roark and G. L. Keenan.)

HEBER W. YOUNGKEN.

INTRAVENOUS USE OF QUININE IN MALARIA.—Limitations to the use of quinine intravenously in malaria treatment is the subject of a report by Dr. K. F. Maxcy just published by the U. S. Public Health Service.

When quinine is given intravenously by routine in malaria treatment it can hardly be claimed that the procedure is without danger. The sudden introduction of a concentrated solution into the blood stream tends to cause circulatory depression and distressing nervous phenomena. Accidental extravasation into the tissues at the point of injection is apt to cause local necrosis and sloughing. Against these

dangers is the unquestionable rapidity with which the drug is brought into contact with the parasites in the blood stream. Except for this there is no clear evidence at present that in ordinary malaria infections the method is more effective than mouth administration in curing an acute attack, in ridding the blood of sexual forms, or in preventing relapse.

Its proper field of usefulness seems to be upon urgent clinical indications of two sorts: first, in cases in which prompt absorption by the gastro-intestinal tract, following mouth administration, is not to be expected because of violent gastro-intestinal disturbance or other cause, or in which it is impossible to give the drug by mouth on account of delirium, coma, etc.; and second, in cases which are gravely ill when first seen by the physician and in whom it is deemed imperative to secure immediate cinchonization. It does not seem necessary nor desirable to use the intravenous route of administration in the simple acute or chronic infections ordinarily encountered, whether tertian or æstivo-autumnal.

When the clinician decides that the method is warranted, the effect upon the patient must be borne in mind. Particularly is it necessary to be sure that the patient is not already suffering from circulatory embarrassment. The technique of the injection must be such as to minimize the danger of untoward effects by observing three cardinal principles: Careful aseptic technique; giving the drug in moderate doses and in dilution; and introducing the solution slowly.

All the precautions which are observed in giving a dose of salvarsan should be observed in giving quinine.

THE CAMPHOR OUTLOOK.—The recently published work of Brooks on the "Non-Benzenoid Hydrocarbons," devotes considerable space to the camphor problem, in relation to the practicability of the synthetic product competing with the natural. The large tree, *Cinnamomum camphora,* is the only source of the natural article, and the process of distilling with steam the chipped wood of mature trees has been carried out in China and Japan for several centuries. Japan has acquired control of practically all of the region occupied by these trees, and the price of camphor has been deliberately advanced, which gave occasion to earnest efforts to produce it artificially. The

greatly increased use of camphor owing to the development of the manufacture of celluloid, still further much increased by the demand for photographic film, has added to the importance of this supply, as has also the demand for transparent windows for automobiles.

For the production of synthetic camphor, the successful methods employ turpentine or pinene as raw material, and, unfortunately, while the primeval camphor forests of Asia are being rapidly reduced, the American turpentine trees are also disappearing. Dr. Brooks expresses the hope that the substitution of light petroleum products in the paint and varnish industries will conserve much of the supply of turpentine. Efforts have been made to cultivate camphor trees, but the substance does not exude from the tree as does turpentine. The woody material must be distilled with steam. The distillation of leaves has not proved profitable. Considerable planting of camphor trees has been done in Florida and California, as well as in some part of the East Indies. Synthetic camphor is prepared from turpentine by conversion into bornyl chloride, the principal source of which is the long-leaved pine, *P. palustris*. The turpentine should be fresh, as old turpentine gives a low yield of bornyl chloride. Borneol, from which bornyl chloride is prepared, exists in Borneo camphor, but the supply from this source is not sufficient.

In this connection, however, a timely suggestion for increasing the yield of turpentine is presented in a paper by W. H. Mason, Laurel, Miss., which was read before the Southern Pine Association, and abstracted in *Building* (Phila.). Mason has carried out on a large scale, with much success, two processes for extracting turpentine, pine oil and rosin from sawed lumber. In one the drying is conducted mainly as in the ordinary dry-kiln, but in the first twenty-four hours steam is used instead of air, and the vapors are led to a condenser. The condensed liquid consists of water and turpentine, which are separated. It is found that the lumber is dried better and more thoroughly, with less warping and will hold paint better. The process has been in use for more than a year. The yield on long leaf pine is about one gallon of turpentine per 1000 feet; on short leaf pine about half this.

In the second method, called "pitch extraction" only the pitch is treated. A grading expert marks the "fat" pieces, which are run into a special retort with steam coils in the bottom. Turpentine is

run in and boiled up, by which the pitch is extracted and water driven out. The solvent liquor is sent to the refining plant to recover the constituents.

H. L.

PASTEUR CENTENNIAL.—Commemoration of the centennial anniversary of the birth of Pasteur will be the occasion of the erection of a statue facing the Strasbourg University, where, as a professor, he began his career. The inauguration ceremonies will take place on May 1, 1923, under the patronage of the Republic, and will consist principally in the unveiling of the statue and the opening of an exhibition of hygiene and bacteriology. This exhibition will be mainly arranged to show the advances made in these subjects as a result of Pasteur's work. A Congress of Hygiene and Bacteriology will be held at the same time.

In estimating the work of Pasteur, his earlier investigations into the phenomena of racemism must not be forgotten. His later work in the study of pathogenetic organisms has overshadowed to a certain extent his labors in physical science, but these were epoch-making. His investigations extended over many years, the results appearing, from time to time, in French journals, with more or less extended abstracts in the journals of other countries, but in the early part of 1860 he delivered, by request, before the Paris Chemical Society two lectures, in which he summarized his labors and set forth the interesting and highly important method of "mesotomization," that is breaking up the racemic association so as to secure one of the active constituents. He also called attention to the curious asymmetry of the crystals of some of these compounds. His experiments were conducted on the tartrates. The two lectures have been printed in English as No. 14 of the "Alembic Club Reprints," with the title, "Researches on the Molecular Asymmetry of Natural Organic Products." A translation into German has appeared as No. 28 of Ostwald's "Klassiker der exacten Wissenschaften."

It is to be hoped that the orators to whom will fall the lot to deliver the addresses on the occasion of the dedication of the statue, will not fail to lay some stress on the services which these early researches did to organic chemistry.

H. L.

SOLID EXTRACTS

Recent scientific evidence points to the existence of man upon this mundane sphere even prior to the great Ice Age. In terms of years this is counted as nearly one-half a million. The recent discovery of the Foxhall man near Ipswich, England, led to this assertion.

Galen, born about 129 A. D., complained that there were no real seekers after truth in his time, but that all were intent upon money, political power or pleasure, and that not five men of all those he had met preferred to be rather than to seem wise. "'Twas ever thus!"

Aluminum with 11 to 14 per cent. of silicon yields an alloy which is lighter than aluminum itself, stronger, more resistant, and more suitable for casting than known aluminum alloys.

Keiselguhr or diatomaceous earth, which has come into extensive use as a filtering and clarifying medium, is formed of incalculable millions of the fossil remains or siliceous skeletons of minute animals, who lived in ancient seas ages ago.

Bile salt (sodium taurocholate) is now used as a remedy for pediculosis. A solution of the salt in eucalyptol has been successfully used for this purpose.

Chlorophyll in plants is analogous in a great many respects to the hemoglobin of the red blood cell. Iron, which it the pivotal element in hemoglobin is absent in chlorophyll, magnesium being considered the important element there. Iron is, however, essential to plant metabolism and is particularly necessary in a synergistic way for the chlorophyll production.

Before the war all flasks for preparing typhoid toxine were made in Germany. When of necessity an American company had to make them, they were found to be far better than any flasks ever imported.

Did you know that carbolic acid is only slightly soluble in liquid paraffin. Only one per cent. dissolves in the paraffin, and any excess of this amount separates out as an oily layer in the bottom of the container.

The laboratory technician states that a pneumonic patient with a high leukocyte (white-cell) count has far better prospects of survival than one having a low or a normal white-cell count.

Medical men are now advocating inoculating all children with a biological product which will safeguard them against diphtheretic infection. No one wishes to offer an objection to such a procedure, if good results come from it, but life for little Johnny of the future will be nothing but "one darn inoculation after another."

Doctors are warning against the haphazard use of gland extracts, since so little is known regarding their standardization and physiologic effects. Yet we know certain patent medicines containing some of the potent gland substances and which are sold to the laity without discrimination.

NEWS ITEMS AND PERSONAL NOTES

DR. R. W. HICKMAN RETIRES.—Dr. Richard W. Hickman, chief of the Quarantine Division, retired March 31 after thirty-four years of continuous service in the Bureau of Animal Industry.

Dr. Hickman was appointed a veterinary inspector March 31, 1888, on the force which was organized to combat contagious pleuropneumonia of cattle in the vicinity of Philadelphia, and December 11, 1888, he was transferred to the force operating in the vicinity of New York City, where the disease was most prevalent. He was conspicuous among those veterinarians, who, under the very unfavorable conditions, accomplished so successfully the first great task assigned to the new bureau, the eradication of contagious pleuropneumonia from the United States.

When, as a result of this accomplishment, the ports of Great Britain were reopened to our export cattle trade, Doctor Hickman was sent to the Union Stock Yards, Chicago, our greatest export cattle market at that time, to organize a system for inspecting export cattle and marking them for identification. May 1, 1892, he was placed in charge of the meat-inspection station at New York City. He was called to Washington November 1, 1900, to take charge of the Miscellaneous Division of the bureau, and July 1, 1905, he was appointed chief of the Quarantine Division.

Though a pharmacist, graduate veterinarian, and a specialist in veterinary education, Doctor Hickman is best known for his services in administering the Federal quarantine which has protected the live stock of the United States against destructive foreign plagues. He has drafted or revised most of the regulations regarding the export and import movement of live stock and is the author of important contributions to veterinary literature. He has also served on committees that were instrumental in placing the work of veterinary colleges on a high plane of instruction and equipment.

In entering upon his well-earned retirement Doctor Hickman carries the high regard and good wishes of his late official associates.

NATIONAL RESEARCH COUNCIL NEWS.—The National Research Council hs elected the following chairmen of its divisions for the year 1922-23:

Division of Foreign Relations—Robert A. Millikan, Foreign Secretary of the National Academy of Sciences, and Director of the Norman Bridge Laboratory of Physics, California Institute of Technology, Pasadena, California.

Division of Educational Relations—Vernon Kellogg, Permanent Secretary, National Research Council, Washington, D. C.

Division of Research Extension—W. M. Corse, formerly General Manager of the Monel Metal Products Corporation, Bayonne, New Jersey.

Research Information Service—Robert M. Yerkes, National Research Council, Washington, D. C.

Division of Physical Sciences—William Duane, Professor of Bio-physics, Harvard University Medical School, Boston, Massachusetts.

Division of Engineering—Alfred D. Flinn, Secretary, Engineering Foundation, 29 West Thirty-ninth Street, New York, N. Y.

Division of Chemistry and Chemical Technology—Edward W. Washburn, Professor of Ceramic Chemistry and Head of the Department of Ceramic Engineering, University of Illinois, Urbana, Illinois.

Division of Geology and Geography—Nevin M. Fenneman, Professor of Geology and Geography, University of Cincinnati, Cincinnati, Ohio.

Division of Medical Sciences—Frederick P. Gay, Professor of Pathology, University of California, Berkeley, California.

Division of Biology and Agriculture—F. R. Lillie, Professor of Embryology, University of Chicago, Chicago, Illinois.

Division of Anthropology and Psychology—Raymond Dodge, Professor of Psychlogy, Wesleyan University, Middletown, Ohio.

BOOK REVIEWS

AUGUSTE LUMIÈRE. Rôle des colloides chez les êtres vivantes. Pp. 311 + viii. Pl. 14. 13.5 x 18.5 cm. Paris, Masson et Cie, 1921.

The contents of this absorbingly interesting little volume can be epitomized in the three sentences which appear on page iii:

"The evolution and flocculation of the colloidal micella considered as bases of normal and pathological physiology.

"The colloidal state conditions life.

"Flocculation determines disease and death."

The work comprises eight chapters devoted to a discussion of the relations between the colloids of the organism and its physiological processes and pathological states, to which is added a most voluminous bibliography filling 150 pages and well indexed. Several of the plates are handsomely colored. Particularly interesting are the plates which illustrate the histology of anaphylaxis compared with that of barium shock.

The following quotations are selected from the summary and give a good idea of the contents of the book.

"The tissues of living beings are constituted, in large part, by colloids and the reactions of which they are the seat and which condition growth, nutrition, disease and death, owe obedience to the laws which govern the evolution of these colloids.

"All colloidal material is composed of micellæ, animated by the Brownian movement, which remain in suspension in a liquid. These micellæ are themselves formed of a nucleus or granule, that is to say of a certain number of molecules of an insoluble body in the intermicellar liquid, surrounded by a layer of another substance, soluble but fixed by adsorption, this last being the active portion of the micella.

"The micellæ evolve, mature, and tend toward flocculation through loss of the perigranular layer, through progressive enlargement, coalescence of nuclei and precipitation. When precipitation occurs, the colloidal state terminates at the same time as the Brownian movement.

"The phenomena which characterize life correspond to the continual exchanges between the adsorbed layer and the intermicellar liquid. These exchanges cease at the moment of flocculation.

"The surface of contact between the micellæ and the liquid medium in which they are suspended is larger as the micellæ are smaller. This surface at which the vital exchanges are effected, is enormous; for the adult man it corresponds to several millions or square meters.

"One must recognize two kinds of colloids in the organism; those which form the cellular protoplasm and those which constitute the extra-cellular liquids, circulating in the organism or entirely impregnating it.

"Flocculation of one of these colloids produces effects differing from those produced by flocculation of the other. When flocculation occurs in the body fluids it induces the symptoms common to many maladies; fever, phlegmasia, dermatoses, arthralgia, etc. When it occurs in cells of which the protoplasmic properties vary in different tissues the symptoms which are developed are, in general, characteristic of a specific disease.

"Foreign proteins occur in two well-differentiated types: a, those derived from pathogenic micro-organisms and which are able to flocculate colloids at once without previous preparation, flocculation which requires a variable period of incubation according to the species; b, the other type can react only after a specific preparation by the same protein. The latter are elaborated by saprophytic microbes or may be derived from the colloids of food.

"Infectious diseases correspond to the first type and chronic diseases to the second.

"It is in the desensitizing of patients impregnated through the accidental penetration of protein into the organism, searching for methods to hinder flocculation or to dissolve the precipitated materials, that one can hope to find the truly curative procedures for acute or chronic pathological states."

The book is very readable and the subject matter is well arranged. The style becomes sometimes a trifle involved due to packing of subordinate and modifying clauses into the sentences, but the author's idea is always clear and readily followed. If the hypotheses advanced in this work and in the similar book by Prof. Danysz,[1] which now have considerable experimental proof behind them, shall be verified and generally accepted they will open a large field for investigation and will give us a new and a simple point of view towards the whole subject of disease and death.

J. F. Couch.

[1] *The Evolution of Disease.* By Prof. J. Danysz. Trans. by Francis M. Rackemann, M. D. Lea & Febiger, Philadelphia and New York, 1921.

THE ELEMENTS OF FRACTIONAL DISTILLATION. By CLARK SHOVE ROBINSON. McGraw-Hill Book Co., New York. Pp. X-205. 16 x 20.5 cm. 1922.

In the preface to this admirable work the author says:

"Young's 'Fractional Distillation,' while a model for its kind, has to do almost entirely with the aspects of the subject as viewed from the chemical laboratory, and there has been literally no work in English available for the engineer and plant operator, dealing with the applications of the laboratory processes to the plant.

"The use of the modern types of distilling equipment is growing at a rapid rate. Manufacturers of chemicals are learning that they must refine their products in order to market them successfully, and it is often true that fractional distillation offers the most available if not the only way of accomplishing this. There has consequently arisen a wide demand among engineers and operators for a book which will explain the principles involved in such a way that these principles can be applied to the particular problem at hand."

The chapters are entitled:

I. The Phase Rule.
II. One Component System.
III. Two Component Systems.
IV. More Complex Systems.
V. The Gas Laws.
VI. Solutions.
VII. Concentrated Solutions.
VIII. Simple Distillation.
IX. Fractionation.
X. Rate of Fractionation.
XI. Discontinuous Distillation.
XII. The Design of a Continuous Still.
XIII. The Fractionating Column.
XIV. The Condenser.
XV. Acessories.
XVI. Continuous Distillation.
XVII. Ammonia.
XVIII. Benzolized Wash Oil.
XIX. Methyl Alcohol.
XX. Ethyl Alcohol.

This book will prove of great value to operators of distilling apparatus. The style of the exposition is simple and plain and should be readily comprehended by the better grade of plant operative. Mathematical treatment has, apparently, been avoided where possible, but in those instances where it is used it is given with commendable completeness.

The book ought to find much application in manufacturing pharmacy where so much distilling must be carried on. It should be consulted by every one who contemplates the purchase and installation of stills, condensers, columns for fractionation, and the numberless items which go to make up the distilling outfit.

To the scientific scholar, the careful and detailed treatment of the underlying theories, and the numerous reproductions of graphs and tables of data will prove of interest.

The book is well printed on excellent paper and is bound well.

JAMES F. COUCH.